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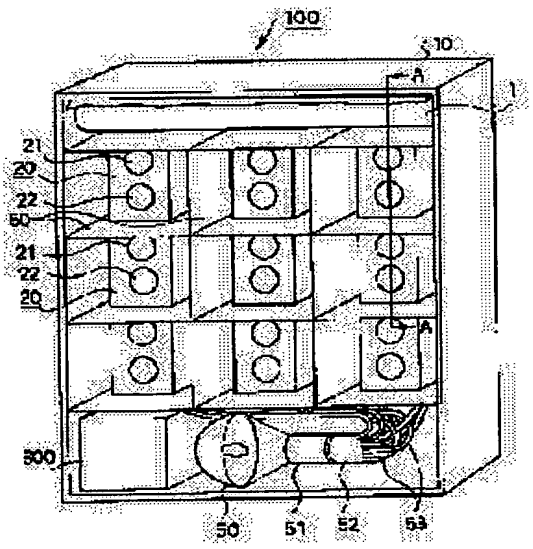
(54) PICTURE DISPLAY SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To make a device light in weight, to facilitate the movement of the device, and to reduce cost by providing a liquid crystal panel and displaying partial pictures generated from plural liquid crystal modules generating the partial picture on a screen.
SOLUTION: The liquid crystal modules 20 are arranged on a cabinet 10, and projection lenses 21 and 22 are provided on each module 20. The pictures from the lenses 21 and 22 are composited and projected from the back of the screen 1. Only one light source 50 is provided, and the radiated light passes an integrator 51, passes through a cable bundle 52 and is divided by an optical fiber cable 53. The integrator 51 uniformizes light from the light source 50. The cable 53 supplies the divided light to the module 20. A light shielding plate 60 provided between the modules 20 prevents the light of each liquid crystal module from interfering with the light of another liquid crystal module.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The screen which displays the partial image generated from two or more liquid crystal modules and the liquid crystal module of the (b) above-mentioned plurality which generate the partial image which is equipped with the image display system (a) liquid crystal panel which has the following elements, and constitutes some images, the optical feed zone which supplies light to the liquid crystal panel of the liquid crystal module of the (c) above-mentioned plurality.
[Claim 2] The above-mentioned liquid crystal module is an image display system according to claim 1 characterized by having the projection lens which compounds the light outputted from the liquid crystal panel for colors, the liquid crystal panel for brightness, and the liquid crystal panel for colors and the liquid crystal panel for brightness.
[Claim 3] The above-mentioned liquid crystal module is an image display system according to claim 2 characterized by having the polarization beam splitter which distributes further the light supplied from the optical feed zone to the above-mentioned liquid crystal panel for colors, and the liquid crystal panel for brightness.
[Claim 4] The above-mentioned liquid crystal module is an image display system according to claim 3 characterized by having further the reflecting plate united with the polarization beam splitter.
[Claim 5] The above-mentioned liquid crystal module is an image display system according to claim 4 characterized by having arranged to a screen and parallel while arranging the optical supply edge, the above-mentioned polarization beam splitter, and the above-mentioned reflecting plate to the above-mentioned liquid crystal module of the above-mentioned optical feed zone to a serial.
[Claim 6] The above-mentioned liquid crystal module is an image display system according to claim 2 characterized by having had the projection lens which projects the image generated with the liquid crystal panel, and having a reflective mirror between a screen and a projection lens.
[Claim 7] The above-mentioned screen is an image display system according to claim 1 characterized by being one panel containing a diffusion material.
[Claim 8] The above-mentioned panel is an image display system according to claim 7 characterized by being installed free [attachment and detachment].
[Claim 9] The above-mentioned panel is an image display system according to claim 8 characterized by being installed possible [rolling up].
[Claim 10] The above-mentioned screen is an image display system according to claim 1 characterized by being the concave screen with which the center section extended far back.
[Claim 11] The above-mentioned screen is an image display system according to claim 10 characterized by being a dome mold screen.
[Claim 12] The above-mentioned screen is an image display system according to claim 1 characterized by consisting of two or more partial screens formed corresponding to two or more liquid crystal modules.
[Claim 13] The above-mentioned partial screen is an image display system according to claim 12 characterized by being a hexagon.
[Claim 14] at least one light source to which the above-mentioned optical feed zone emits light

to two or more liquid crystal modules, and above — the image display system according to claim 1 characterized by having the distribution section which distributes the light emitted from the one light source even if few to two or more above-mentioned liquid crystal modules.
[Claim 15] the above-mentioned distribution section — the above — the image display system according to claim 14 characterized by having two or more fiber optic cables which distribute the light from the one light source to each liquid crystal module even if few.
[Claim 16] The above-mentioned fiber optic cable is an image display system according to claim 15 characterized by having a plastics fiber.
[Claim 17] The above-mentioned fiber optic cable is an image display system according to claim 15 characterized by consisting of two or more fibers.
[Claim 18] Two or more above-mentioned fibers are image display systems according to claim 17 characterized by being knit at random.
[Claim 19] The above-mentioned fiber optic cable is an image display system according to claim 17 or 18 characterized by constituting a polygon from an end face by the side of a liquid crystal module with two or more fibers.
[Claim 20] The polygon of the end face by the side of the liquid crystal module of the above-mentioned fiber is an image display system according to claim 19 characterized by being the panel configuration of a liquid crystal panel, and similarity.
[Claim 21] The above-mentioned optical feed zone is an image display system according to claim 14 characterized by having further the substage condenser which condenses and outputs a surrounding light.
[Claim 22] The above-mentioned image display system is equipped with the signal-processing section which generates further the partial picture signal which generates a partial image to each liquid crystal module. The above-mentioned signal-processing section The image display system according to claim 1 characterized by having two or more processor sections which input a picture signal, and choose and output the partial picture signal corresponding to each liquid crystal module from the bus which transmits a picture signal, and the above-mentioned bus formed corresponding to each liquid crystal module.
[Claim 23] The above-mentioned processor section is an image display system according to claim 22 characterized by having further the amendment circuit which amends the above-mentioned partial picture signal based on the display property of each liquid crystal module.
[Claim 24] The above-mentioned amendment circuit is an image display system according to claim 23 characterized by amending the display property of each liquid crystal module so that it may be in agreement with the criteria property that the electrical potential difference to a liquid crystal module is proportional to the optical output from a liquid crystal module.
[Claim 25] It is the image display system according to claim 22 which the above-mentioned processor section changes a partial picture signal into the signal which used the technique of area gradation, and is characterized by the above-mentioned liquid crystal panel generating a partial image using the technique of area gradation.
[Claim 26] It is the image display system according to claim 22 which it connects with the above-mentioned bus, and the above-mentioned signal-processing section is further equipped with the control section which directs the partial picture signal which should be chosen to two or more above-mentioned processor sections, and is characterized by the above-mentioned processor section choosing the partial picture signal directed by the above-mentioned control section.
[Claim 27] The above-mentioned image display system is an image display system according to claim 1 characterized by having the cabinet which arranges the liquid crystal module of further the above-mentioned plurality removable, and installs it.
[Claim 28] It is the image display system according to claim 27 characterized by equipping the above-mentioned liquid crystal module with the projection lens attached exchangeable, and attaching the above-mentioned liquid crystal module possible [modification of the distance of a projection lens and a liquid crystal panel] between a screen and a liquid crystal panel while the above-mentioned cabinet attaches the above-mentioned liquid crystal module possible [modification of the distance of the above-mentioned liquid crystal module and a screen].

[Claim 29] The above-mentioned image display system is an image display system according to claim 1 characterized by having the cutoff plate which intercepts the light outputted to the boundary of the partial image display further displayed on a screen adjacently from a liquid crystal module.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image display system which used two or more liquid crystal panels. It is related with the image display system of the modular mold which divides and displays one image especially.
[0002]
[Description of the Prior Art] There was big screen CRT (cathode Rey tube) equipment as shown in drawing 28 as equipment which displays a large-sized image conventionally. In drawing 28 , the screen 1 has the size of 37 inches. Since CRT3 is used for this display, it has big depth D. Thus, since CRT3 is used, it is difficult to be unable to make depth D sufficiently small but to offer a thin display using CRT.
[0003] Drawing 29 is the large-sized display panel which used the conventional fluorescent indicator tube. A fluorescent indicator tube displays the color of three colors of R, G, and B, respectively, and is installed in the hall in which the public, such as a baseball field and a racetrack, gathers.
[0004] Drawing 30 is drawing showing the configuration of the projection TV of the reflective type tooth-back projection mold shown in the "color liquid crystal display" (display technical series, Shunsuke Kobayashi, Sangyo Tosho Publishing, P203). Drawing 31 is cross-section structural drawing of the screen 1 of projection TV as shown in drawing 30 . Similarly cross-section structural drawing of drawing 31 is shown in P205 of a "color liquid crystal display" shown above. Although projection TV as shown in drawing 30 can generate a large-sized image 40 inches or more, as shown in drawing 31 , it will have to use the lenticular plate 1002 and Fresnel lens 1001 for a screen, and will become very expensive equipment. Fresnel lens 1001 and the lenticular plate 1002 are raising the horizontal vision property by using in order to make high main gain to the vision person of projection TV, and taking structure as a screen 1 shows to drawing 31 . Moreover, although not illustrated, it has the filter for omitting the ultraviolet rays of the light emitted from the light source.
[0005] Drawing 32 shows the display which divides four screens for one screen and displays an image. Drawing 33 shows the internal structure. Respectively corresponding to the divided partial screens 1a-1d, the projection lenses 2a-2d and CRT 3a-3d are formed. A distributor 4 outputs picture signal Ia-Id which inputted the picture signal I, divided the picture signal into one fourth, and was divided, respectively to CRT 3a-3d. In partial screen 1a-1d, boundaries L1 and L2 exist and removal of these boundaries L1 and L2 has been a technical problem.
[0006]
[Problem(s) to be Solved by the Invention] The display using large-sized CRT shown in drawing 28 could not make depth D small, but had the fault that equipment was not made into a thin shape. Moreover, since the image was generated using one CRT, only the about 37 inches [a maximum of] image was made, and a big image was not able to be generated any more.
[0007] Moreover, the display system using the fluorescent indicator tube shown in drawing 29 had the fault that the fluorescent indicator tube which failure generated whenever the fluorescent indicator tube broke down had to be exchanged. Especially the activity of exchanging

a fluorescent indicator tube with failure since it is attached in heights, such as a baseball field and a racetrack, was an activity which spends time amount with risk.
[0008] Moreover, although the conventional projection TV shown in drawing 30 and drawing 31 was attaining thin shape-ization by reflecting an optical path inside a cabinet, it was not able to attain thin shape-ization enough, so that it used by one domestic room. Moreover, in order to raise main gain, the screen is having special structure which used the Fresnel lens and the lenticular plate, and could not but become what has the expensive price of equipment. Moreover, the Fresnel lens and the lenticular plate interfered mutually and there was a fault of producing pinstriped moire.
[0009] Moreover, the display using two or more small CRT shown in drawing 32 and drawing 33 had the fault that boundaries L1 and L2 will be made to the divided partial screens 1a-1d. Moreover, although small CRT 3a-3d was used, depth D of small CRT could not be made sufficiently small, and thin shape-ization of equipment was not able to be attained.
[0010] Moreover, since CRT was used for the conventional display or the fluorescent indicator tube was used for it, it had the fault that own weight of equipment became large. Therefore, once it installed, it could be hard to say that the display system is carried easily, and is carried out, or is moved.
[0011] This invention is made in order to solve the above troubles, and it aims at obtaining the image display system which can generate a large-sized image.
[0012] Moreover, this invention aims at obtaining a sufficiently available image display system also in the tooth space of the thin and domestic room.
[0013] Moreover, this invention aims at obtaining the movable image display system which made weight of equipment light.
[0014] Moreover, this invention aims at obtaining the image display system of a low price.
[0015] Moreover, this invention aims at obtaining the scalable image display system which can change the whole screen configuration while it can change the size of a screen.
[0016] Moreover, this invention aims to let a maintenance obtain an easy image display system, when it breaks down.
[0017]
[Means for Solving the Problem] The image display system concerning this invention has the following elements.
(a) The screen which displays the partial image generated from two or more liquid crystal modules and the liquid crystal module of the (b) above-mentioned plurality which generate the partial image which is equipped with a liquid crystal panel and constitutes some images, the optical feed zone which supplies light to the liquid crystal panel of the liquid crystal module of the (c) above-mentioned plurality.
[0018] The above-mentioned liquid crystal module is characterized by having the projection lens which compounds the light outputted from the liquid crystal panel for colors, the liquid crystal panel for brightness, and the liquid crystal panel for colors and the liquid crystal panel for brightness.
[0019] The above-mentioned liquid crystal module is characterized by having the polarization beam splitter which distributes further the light supplied from the optical feed zone to the above-mentioned liquid crystal panel for colors, and the liquid crystal panel for brightness.
[0020] The above-mentioned liquid crystal module is characterized by having further the reflecting plate united with the polarization beam splitter.
[0021] The above-mentioned liquid crystal module is characterized by having arranged to a screen and parallel while it arranges the optical supply edge, the above-mentioned polarization beam splitter, and the above-mentioned reflecting plate to the above-mentioned liquid crystal module of the above-mentioned optical feed zone to a serial.
[0022] The above-mentioned liquid crystal module is characterized by having had the projection lens which projects the image generated with the liquid crystal panel, and having a reflective mirror between a screen and a projection lens.
[0023] The above-mentioned screen is characterized by being one panel containing a diffusion material.

[0024] The above-mentioned panel is characterized by being installed free [attachment and detachment].
[0025] The above-mentioned panel is characterized by being installed possible [rolling up].
[0026] The above-mentioned screen is characterized by being the concave screen with which the center section extended far back.
[0027] The above-mentioned screen is characterized by being a dome mold screen.
[0028] The above-mentioned screen is characterized by consisting of two or more partial screens formed corresponding to two or more liquid crystal modules.
[0029] The above-mentioned partial screen is characterized by being a hexagon.
[0030] at least one light source to which the above-mentioned optical feed zone emits light to two or more liquid crystal modules, and above — even if few, it is characterized by having the distribution section which distributes the light emitted from the one light source to two or more above-mentioned liquid crystal modules.
[0031] the above-mentioned distribution section — the above — even if few, it is characterized by having two or more fiber optic cables which distribute the light from the one light source to each liquid crystal module.
[0032] The above-mentioned fiber optic cable is characterized by having a plastics fiber.
[0033] The above-mentioned fiber optic cable is characterized by consisting of two or more fibers.
[0034] Two or more above-mentioned fibers are characterized by being knit at random.
[0035] The above-mentioned fiber optic cable is characterized by constituting a polygon from an end face by the side of a liquid crystal module with two or more fibers.
[0036] The polygon of the end face by the side of the liquid crystal module of the above-mentioned fiber is characterized by being the panel configuration of a liquid crystal panel, and similarity.
[0037] The above-mentioned optical feed zone is characterized by having further the substage condenser which condenses and outputs a surrounding light.
[0038] The above-mentioned image-display system is equipped with the signal-processing section which generates further the partial picture signal which generates a partial image to each liquid-crystal module, and the above-mentioned signal-processing section is characterized by to have two or more processor sections which input a picture signal, and choose and output the partial picture signal corresponding to each liquid-crystal module from the bus which transmits a picture signal, and the above-mentioned bus formed corresponding to each liquid-crystal module.

[0039] The above-mentioned processor section is characterized by having further the amendment circuit which amends the above-mentioned partial picture signal based on the display property of each liquid crystal module.
[0040] The above-mentioned amendment circuit is characterized by amending the display property of each liquid crystal module so that it may be in agreement with the criteria property that the electrical potential difference to a liquid crystal module is proportional to the optical output from a liquid crystal module.
[0041] The above-mentioned processor section changes a partial picture signal into the signal which used the technique of area gradation, and the above-mentioned liquid crystal panel is characterized by generating a partial image using the technique of area gradation.
[0042] Further, it connects with the above-mentioned bus, the above-mentioned signal-processing section is equipped with the control section which directs the partial picture signal which should be chosen to two or more above-mentioned processor sections, and the above-mentioned processor section is characterized by choosing the partial picture signal directed by the above-mentioned control section.
[0043] The above-mentioned image display system is characterized by having the cabinet which arranges the liquid crystal module of further the above-mentioned plurality removable, and installs it.
[0044] While the above-mentioned cabinet attaches the above-mentioned liquid crystal module possible [modification of the distance of the above-mentioned liquid crystal module and a

screen], the above-mentioned liquid crystal module is characterized by having the projection lens attached exchangeable and attaching the above-mentioned liquid crystal module possible [modification of the distance of a projection lens and a liquid crystal panel] between a screen and a liquid crystal panel.
[0045] The above-mentioned image display system is characterized by having the cutoff plate which intercepts the light outputted to the boundary of the partial image display further displayed on a screen adjacently from a liquid crystal module.
[0046]
[Embodiment of the Invention] Drawing 1 is drawing showing an example of the image display system of this invention. In drawing 1 , in order to display a internal structure, the screen 1 shows the condition of being rolled round by the upper part of a cabinet 10. Or a screen 1 may be installed dismountable. When an image is actually displayed, a screen 1 is a wrap about the image display system 100 whole. In the example shown in drawing 1 , the liquid crystal module 20 is arranged in the array of 3x3 at the cabinet 10. The projection lenses 21 and 22 are formed in each liquid crystal module 20. The image projected from the projection lenses 21 and 22 is compounded, and is projected from behind a screen 1. The control section 300 is formed in the interior of a cabinet 10, and the image display system 100 whole is controlled. Moreover, only the one light source 50 is formed in the interior of a cabinet 10. The light emitted from the light source passes an integrator 51, and is divided by the fiber optic cable 53 through the cable bundle 52. An integrator 51 makes light from the light source 50 homogeneity. A fiber optic cable 53 supplies the light divided to each liquid crystal module 20. The gobo 60 prepared in the intervals of each liquid crystal module 20 is sheet metal for the light from each liquid crystal module to interfere mutually with the light from other liquid crystal modules, and not suit.
[0047] Drawing 2 is the A-A sectional view of the image display system shown in drawing 1 . The rolling-up shaft 12 for rolling round a screen 1 exists in a cabinet 10. the motor which is not illustrating the rolling-up shaft 12 — or it is a shaft for rolling round a screen 1 with hand control. The bar 13 has the function for carrying out alignment of the screen 1 to the front face of the image display system 100. Two or more installation sections 11 exist in the cabinet 10, and the liquid crystal module 20 can be attached in a cabinet by the installation section 11. Installation of the installation section 11 and the liquid crystal module 20 is performed by the well-known attachment-and-detachment device which used the screw and the magnet. Moreover, a gobo 60 is put in the installation section 11 removable. This gobo 60 is for making it the light from each liquid crystal module not interfere with light with other liquid crystal modules. For example, in drawing 2 , since the light shown by the dotted line is intercepted with a gobo 60, it is useful to not interfering with the light from other liquid crystal modules, and generating a clear image. As the thickness of a gobo 60 is thin, it is better. For example, it is desirable to use a black griddle with the thickness of about 0.1-0.2mm. When the thickness of a gobo 60 becomes thick, the shadow of a gobo will be generated to a screen. In the case of 0.1mm - 0.2mm thickness, it becomes the range which does not do a bad influence at all to an image, without generating the shadow of a gobo to a screen.
[0048] The projection lenses 21 and 22 are arranged at the liquid crystal module 20. On a screen, the light from the projection lenses 21 and 22 overlaps, and is projected. Moreover, a fiber optic cable 53 is connected to the liquid crystal module 20. The optical module 30 by which the modularization was further carried out to the interior exists in the liquid crystal module 20. The lens 31, the polarization beam splitter 32, and the reflective mirror 33 are arranged by the optical module 30 at the serial. In the side face of a polarization beam splitter 32, the liquid crystal panel 34 for colors is arranged. In the side face of the reflective mirror 33, the liquid crystal panel 35 for brightness is arranged. The arrangement location of the liquid crystal panel 34 for colors has a direction more desirable than the liquid crystal panel 35 for brightness near the light irradiated from a fiber optic cable 53. It is for strengthening the optical output of the liquid crystal panel for colors as much as possible. For example, when arrangement of the liquid crystal panel for colors and the liquid crystal panel for brightness is made reverse, it is desirable for reflection of the reflective mirror 33 to arrange the liquid crystal panel 34 for colors on the side face of a polarization beam splitter 32, since not total reflection but an optical output will be

able to weaken.
[0049] As shown in drawing 2 , while arranging a fiber optic cable 53, a lens 31, a polarization beam splitter 32, and the reflective mirror 33 to a serial, depth D of equipment can be made small by arranging two or more components arranged at this serial to a screen and parallel. when size of the liquid crystal panel 34 for colors and the liquid crystal panel 35 for brightness is made into an about 0.7 inches thing, the depth D0 of the optical module 30 is in ** — it is good at about 1 inch of **. Since the part which generates an image is settled in about 1 inch, very thin equipment can be offered compared with the display using the conventional CRT. For example, when the 0.7 inches liquid crystal panels 34 and 35 are used, it is possible to set depth D of the image display system 100 whole to about 20cm.
[0050] Drawing 3 is drawing showing the detail of the fiber optic cable shown in drawing 1 and drawing 2 . The cable bundle 52 is constituted by the fiber 54. As shown in drawing 1 , to divide and supply light to nine liquid crystal modules, nine fiber optic cables 53 are required. For example, a fiber optic cable 53 is constituted by packing 12 fibers into one cable. Therefore, all the numbers of a fiber 54 become [9x12=108]. That is, the cable bundle 52 consists of 108 fibers 54. The end-face configuration by the side of the light source of the cable bundle 52 is circular. Since the light source 50 is equipped with reflecting mirrors, such as a paraboloid-of-revolution mirror or a rotation ellipse mirror, the cross section of the light emitted from the light source 50 is carrying out the round shape. In order to absorb this light efficiently, as for the cross section of an integrator 51, and the cross section of the cable bundle 52, it is desirable to carry out the round shape. In addition, in the above-mentioned explanation, although a configuration is simplified and all the numbers of a fiber are made into 108, the number of a fiber is the need about 7000-10,000 in fact, in order to equalize optical intensity distribution. Or although based also on the size of a fiber, a fiber cable may consist of tens of thousands of fibers. On the other hand, as for the end face of a fiber optic cable 53, it is desirable to carry out the same configuration as a liquid crystal panel. For example, it is desirable for the end face of a fiber optic cable 53 to carry out [the aspect ratio] the rectangle of 3:4 similarly, when the liquid crystal panel 34 for colors is carrying out the configuration of 3:4. When the end face of a fiber optic cable 53 is carrying out the rectangle of 3:4, the light emitted from a fiber optic cable 53 is used as it is that there is no futility in a liquid crystal panel 34.
[0051] Since according to this example the circular flux of light was rearranged according to the array of the fiber 54 in the interior of a fiber optic cable and the flux of light with a circular cross section generated from the light source in the display using the usual liquid crystal panel has changed it into the rectangle although a perimeter part will be cut and it will produce futility when it is irradiated by the liquid crystal panel in which the rectangle carried out the configuration, it does not become useless. Since 12 fibers 54 are used in order to simplify explanation, and one fiber optic cable 53 is constituted from this example, the flux of light with the same aspect ratio of 3:4 as a liquid crystal panel is generable by arranging a fiber 54 to 3x4. Or thousands of to tens of thousands of fibers may be arranged to the integral multiple of 3x4. Moreover, the flux of light which has the aspect ratio of 3:4 in the cable of the rectangle in which an end face has the aspect ratio of 3:4 by holding a fiber may be generated. Even if it is the case where a fiber optic cable 53 cannot make the aspect ratio of a liquid crystal panel, and the same aspect ratio, the flux of light of the aspect ratio same as a result as a liquid crystal panel is generable by changing an aspect ratio with a lens 31. For example, what is necessary is to constitute the square of 3x3, to double 4/3 in a longitudinal direction with a lens 31, to generate the flux of light of the rectangle of 3:4, and just to irradiate a liquid crystal panel 34, when the fiber optic cable 53 consists of nine fibers 54.
[0052] Although the cable bundle 52 consists of two or more fibers 54 as mentioned above, it can make homogeneity light outputted from a fiber optic cable 53 by knitting a fiber 54 at random inside the cable bundle 52. When it has arranged straight, without knitting an optical fiber 54 within the cable bundle 52, the part toward which the light emitted from the light source 50 inclined will be outputted to the specific fiber optic cable 53. In the cross-section part, the light from the light source 50 has strength, and is not uniform. For example, in the central part of the flux of light, a powerful light is emitted and the taper is emitted in the circumference part. When

light is outputted to a direct fiber optic cable from these parts, the light which inclined for every fiber optic cable will be irradiated by the liquid crystal panel as it is. Therefore, the image generated will also be able to do nonuniformity. However, like this example, by knitting fiber 54 ** at random and uniting it, the light outputted from two or more fiber optic cables 53 becomes uniform, and serves as an image in which the image generated with a liquid crystal panel as a result does not have variation, either.

[0053] Moreover, it becomes unnecessary to use the integrator 51 shown in drawing 1 by knitting a fiber 54 at random and setting it. An integrator 51 is used in order to make into homogeneity light emitted from the light source 50, but as mentioned above, since [that a fiber is random] it knits, unites and is alike and equalization of an optical output can be attained more nearly similarly, it becomes unnecessary [an integrator 51].

[0054] Use of a quartz fiber and a plastics fiber can be considered as a fiber 54. If a plastics fiber is used, since ultraviolet rays can be omitted, the filter which omits ultraviolet rays from the light from the light source 50 becomes unnecessary.

[0055] As shown in drawing 1 , the big description of this image display system 100 is the point of having the one light source to two or more liquid crystal modules 20. The cost of equipment can be reduced while the whole equipment lightweight-izes light from the one light source by supplying light to two or more liquid crystal modules using a fiber optic cable. Moreover, a maintenance is [that what is necessary is just to exchange lamps] easy when failure arises on the lamp of the light source.

[0056] moreover, the thing for which a screen 1 is wound up even when a certain failure occurs to the liquid crystal module 20, as shown in drawing 1 and drawing 2 — or by removing a screen 1, the liquid crystal module 20 can be taken out from the front face of the image display system 100, and it can maintain easily. When the cause of failure of the liquid crystal module 20 is not known, it is also possible to exchange the liquid crystal module 20 in a site. Moreover, exchange of the lamp of the light source mentioned above can also be performed from the front face of the image display system 100. Moreover, since a gobo 60 can also be taken out and inserted, a maintenance is still easier. Moreover, the liquid crystal panel is lightweight compared with CRT, and the liquid crystal module 20 is lightweight compared with CRT. Moreover, the image display system 100 whole can be made lightweight that what is necessary is just to also have the one light source.

[0057] Drawing 4 is drawing showing the configuration of the signal-processing section of the image display system shown in drawing 1 . Although not illustrated to drawing 1 and drawing 2 , the processor section 220 is arranged at each liquid crystal module 20, respectively. Each processor section 220 is connected by the bus 210. The bus 210 is further connected to the control section 300. A control section 300 outputs the control signal which controls the processor section to a bus 210 while outputting the picture signal which inputted the picture signal I and was inputted from the exterior to a bus 210. Each processor section 220 generates driving signals C and Y from the partial picture signal which extracted and extracted the partial picture signal based on the control signal outputted from the control section, and outputs them to the liquid crystal panel 34 for colors, and the liquid crystal panel 35 for brightness while it inputs the picture signal outputted from the control section.

[0058] The coding section (COD) 310, memory 320, CPU330, and the partial image specification part 340 exist in a control section 300. The partial image specification part 340 grasps the image display structure of a system, and specifies the partial image which should be extracted to each processor section 220 based on the image display structure of a system. For example, when the image of a certain image display system consists of four partial images, it is specified that it extracts one fourth of images to each processor section. Or when an image consists of nine partial images, it is specified that it extracts one ninth of images to each processor section. Moreover, it specifies which part of an image should be extracted to each processor section. Each processor section is programmed to be able to extract the partial image of the range specified by the partial image specification part 340. Since this partial image specification part 340 exists, even when the image division specification of an image display system is changed, in the processor section, modification of what is also unnecessary, and it can respond to

specification modification flexibly. Thus, since the processor section can extract the partial image specified by the partial image specification part 340, when the case where the size of an image display system is changed, the number of arrays, and a configuration are changed, it is not necessary to change any of each processor section, and an image can be displayed.
[0059] The coding section 310 of a control section 300 inputs a picture signal I, and outputs it to a bus 210 by making the signal into a digital sign. The picture signal outputted to a bus is a picture signal for one screen. Each processor section inputs only the partial image specified by the partial image specification part 340, respectively, as mentioned above.
[0060] CPU230, memory 240, the decode section (DEC) 250, and the amendment circuit 260 exist in each processor section 220. The decode section 250 decodes the picture signal inputted from the bus 210. While managing decode processing of the decode section 250, CPU230 specifies only a partial image required for the processor section to display, and is made to decode, as mentioned above. The amendment circuit 260 is a circuit which amends driving signals C and Y in order to make the property of two or more liquid crystal panels in agreement with a criteria property.
[0061] Drawing 5 is drawing showing the property of a liquid crystal panel. In drawing 5 , an axis of abscissa shows the electrical potential difference V of driving signals C and Y, and the axis of ordinate shows the reinforcement P of the optical output outputted from a liquid crystal panel. There is a property of a proper in a liquid crystal panel for every liquid crystal panel. In drawing 5 , two properties, X1 and X2, are shown. For example, when the electrical potential difference of a driving signal is 4V, to the reinforcement of an optical output being P1 according to the property X1, according to the property X2, luminous intensity is P2 and both have a difference (P1 !=P2). When this difference exists, a different output for every partial image will be carried out. In order to keep the same the adjacent degree and the brightness of a color of a partial image, the property of a liquid crystal panel must be uniform. The amendment circuit 260 is a circuit for making a property X1 and a property X2 as shown in drawing 5 in agreement with one criteria property.
[0062] Drawing 6 is drawing explaining actuation of the amendment circuit 260. In drawing 6 , the straight line from P0 to P7 is the criteria property S. Drawing 7 is drawing showing the configuration of the amendment circuit 260. ROM261 inputs the digital driving signal IN before amendment, and outputs the digital driving signal OUT after amendment. A digital-analog converter 262 changes the digital driving signal OUT after amendment into the driving signal C of an analog.
[0063] Drawing 8 is the amendment table memorized inside ROM261. ROM261 inputs the digital driving signal IN before amendment, and searches and outputs the digital driving signal OUT after amendment from the amendment table shown in drawing 8 . For example, as shown in drawing 6 , when the electrical potential difference of a driving signal is 4V, according to the property X1, the reinforcement of an optical output is P1, but as for the criteria property S, P3 is shown. According to the property X1, in order to output the reinforcement P3 of an optical output, the driving signal of 4.5V is needed. Therefore, as shown in drawing 8 , when there is an input of 4V, the reinforcement of an optical output can be changed into P3 from P1 by outputting 4.5V. The reinforcement of an optical output can be set to P3 to the driving signal of 4V by using the same amendment table also to a property X2. What is necessary is just to change the driving signal of 4V into the driving signal of 4.4V, in order to consider as the reinforcement P3 of an optical output when there is an input of 4V to a property X2 as shown in drawing 6 . When there is an input of 4V to properties X1 and X2, thus, conventionally As the reinforcement of an optical output shows drawing 5 , it is P1 and P2, and to there having been a difference, in this example, both the reinforcement of an optical output called P3 can be obtained, and the degree and brightness of a color of an image which are generated from a liquid crystal panel can be made into homogeneity also in a property X1 or a property X2. In drawing 6 , the criteria property S shows the case where the reinforcement P of an optical output increases proportionally by change of the electrical potential difference V of a driving signal. Thus, it is the role of the amendment circuit which giving linear relation between the electrical potential difference V of a driving signal and the reinforcement P of an optical output mentioned above. That is, it is the

role of the amendment circuit which changing the electrical potential difference of a driving signal so that the property which each liquid crystal panel has may be doubled with this criteria property mentioned above. In addition, the amendment circuit using ROM261 shown in drawing 7 and drawing 8 is an example, and it is possible to amend the property of each liquid crystal panel similarly using other circuits or other software.

[0064] Drawing 9 shows the example which formed the area gradation processing section 270 instead of the amendment circuit 260 of the processor section 220 mentioned above. It is necessary to amend the property of a liquid crystal panel because there was the same property part which cannot carry out an optical output to the electrical potential difference V of a driving signal as shown in drawing 5 . If the optical output of each property displays an image like [in the case of being 10V] only using the electrical potential difference which surely becomes equal when the electrical potential difference V of the driving signal shown in drawing 5 is 0V and, it will become unnecessary then, to amend the electrical potential difference V of a driving signal. That is, by using a liquid crystal panel in the state of either ON or OFF, even if properties differ between liquid crystal panels, it can be used satisfactory at all. The area gradation processing section 270 displays an image only using the case where the electrical potential difference V of the driving signal shown in drawing 5 is 0V, and the case where it is 10V. That is, image display is carried out using binary [of ON or OFF].

[0065] Drawing 10 is drawing showing the various binary-ized technique for the gradation reappearance shown in "imaging" (the edited by Society of Electrophotography of Japan, January 20, Showa 63 issue, P31). The area gradation processing section 270 expresses neutral colors (gradation) with binary using one technique of the binary-ized technique as shown in drawing 10 .

[0066] Drawing 11 is drawing showing an example of an image display system with the array of 4x4. When one screen consists of 1024x1280 dots, a partial image consists of 256x320 dots. Moreover, the size of a partial image is 17.5 inches and the size of a whole image is 17.5x4=70 inch. 81,920x16=1,310,720 dot can be displayed by the thing which displays 256x320=81,920 dot, then the whole using a 0.7 inches liquid crystal panel. When displaying the image of 640x320 dots of one image using area gradation, using this number of pixels, what is necessary will be to become 1,310,720/(640x320) =6.4 dot, and just to display 1 pixel by about 6 dots. In this example, although the case of 4x4 is shown, if the size of this array becomes still larger, the number of dots which can be used for 1 pixel can be increased further, and it will become possible to perform more advanced gradation processing of 16 gradation or 32 gradation.

[0067] Drawing 12 is drawing showing other examples of the image display system of this invention. A different point in the configuration shown in drawing 12 and the configuration shown in drawing 2 is a point of using the projection lenses 21a and 22a with which focal distances differ instead of the projection lenses 21 and 22. When the focal distance of a projection lens is changed, the distance D1 from a projection lens to a screen 1 and the distance D2 from a projection lens to a liquid crystal panel must be changed. Then, the liquid crystal module 20 is attached in the direction of arrow heads A1 and A2 possible [a slide] to a mount 11. Moreover, the optical module 30 is attached in the direction of an arrow head B1 and B-2 possible [a slide] to a liquid crystal module. Thus, even when a projection lens is exchanged by attaching a liquid crystal module and an optical module possible [a slide], this image display system 10 is able to correspond flexibly. In addition, especially structure where the liquid crystal module 20 and the optical module 30 are attached possible [a slide] can be performed using a well-known sliding mechanism etc., although not shown in drawing 12 . Moreover, justification by these slides can be performed from the front face of the image display system 100 by sampling a gobo 60 by winding up a screen 1 again.

[0068] As mentioned above, the gobo 60 is attached in the mount 11 at extraction-and-insertion freedom. By extracting a gobo 60, the installation and the maintenance of a liquid crystal module or an optical module which were mentioned above become easy. Moreover, it becomes easy to exchange, when gobo 60 the very thing is damaged.

[0069] Drawing 13 is drawing showing other examples of the liquid crystal module 20. The point that the liquid crystal module 20 shown in drawing 13 differs from the liquid crystal module

shown in drawing 2 is a point of using total reflection plate 33a, instead of the reflective mirror 33. Although loss of the light by the reflective mirror 33 occurs when using the reflective mirror 33 shown in drawing 2 , total reflection plate 33a shown in drawing 13 is a reflecting plate using a refractive index, and carries out total reflection of the inputted light. Therefore, there is no loss of the light by reflection. It unites with a polarization beam splitter 32, and total reflection plate 33a can be made the configuration which carried out the modularization of the total reflection plate 33a to the polarization beam splitter 32 easily by fabricating a polarization beam splitter 32 and total reflection plate 33a on both sides of the matter of a refractive index n.

[0070] Drawing 14 is drawing showing other examples of the liquid crystal module 20. In drawing 14 (a), the example which uses two polarization beam splitters 32 and 36 is shown. 71-74 are reflective mirrors which form an optical path. A polarization beam splitter 36 compounds the image from two liquid crystal panels 34 and 35. Therefore, the number of projection lenses is one sufficient. On the other hand, the example shown in drawing 14 (b) shows the example which has arranged the liquid crystal panel perpendicularly to the polarization beam splitter 32. In addition, although not illustrated especially, the case where the liquid crystal panel for colors of one sheet only exists in a liquid crystal module not only in when two liquid crystal panels, the liquid crystal panel for colors and the liquid crystal panel for brightness, exist is sufficient. Or the liquid crystal panel for colors of three sheets which displays each of R, G, and B may exist in the liquid crystal module. Furthermore, the case where the liquid crystal panel of four sheets which displays R, G, B, and Y, respectively exists is sufficient.

[0071] Drawing 15 is drawing showing an example of an image display system which used the reflective mirror 70. It is reflected by the reflective mirror 70 and the light projected from the projection lens 21 is projected behind a screen. When the reflective mirror 70 exists, it becomes possible to make depth D of an image display system still smaller. Furthermore, since the reflective mirror itself can shade the light which comes from other liquid crystal modules when the reflective mirror 70 exists, the gobo 60 which was mentioned above is omissible. However, an omissible gobo is only a gobo placed in the vertical direction, and the gobo put on right and left is required.

[0072] Drawing 16 is drawing showing other examples of the image display system of this invention. In drawing 1 and drawing 2 , although the liquid crystal module existed independently for every partial image, when shown in drawing 16 , it is going to constitute an image display system by arranging each part articles, such as a projection lens and a liquid crystal panel, to an array plate for every components. That is, the projection lenses 21 and 22 are arranged to the projection lens array plate 400. Moreover, liquid crystal panels 34 and 35 are arranged to the liquid crystal panel array plate 500. Moreover, a polarization beam splitter 32 and the reflective mirror 33 are arranged to the array plate 600. Furthermore, a lens 31 is arranged to the lens array plate 700. A fiber optic cable 53 is arranged to the fiber optic cable array plate 800. Thus, each arranged array plate is arranged with predetermined spacing to the cabinet 10 shown in drawing 17 . When maintaining each array plates 400-800, it can carry out by taking out each array plate by opening the side panel (not shown) of a cabinet 10 and making each array plate slide along a slot 99. [0073] Drawing 18 is drawing showing other examples of the image display system of this invention. In the example mentioned above, although the case where the screen consisted of one panel was explained, the case where the screen itself is divided partially is shown in this example. The modularization of the image display system can be carried out by dividing a screen into the partial screens 1a, 1b, and 1c and ... When shown in drawing 18 , the case where it consists of 3x4=12 piece modules 900 is shown.

[0074] Drawing 19 is drawing showing the B-B cross section of the module shown in drawing 18 . It can dissociate with other modules and actuation of each module 900 is attained as some screens by connecting a module 900 with a fiber optic cable 53 and the bus 210 which is not illustrated. As mentioned above, it becomes possible to display the partial image with which each module 900 was specified by the processor section 220 which is not illustrated existing in the interior of a module 900, and specifying the partial image which a control section 300 should display to this processor section 220 through a bus 210.

[0075] Drawing 20 is drawing showing other examples of the light source of this invention. In the

example mentioned above, although the case where light was emitted and used from the light source 50 was explained, when shown in drawing 20 , the natural light (sunlight) is condensed with a substage condenser 58, and the case where light is supplied to the image display system 100 by which the collection-and-delivery section 59 has been arranged in each part store is shown. Since the light condensed by using the natural light is a parallel ray, it becomes possible to generate a clearer image. Although the substage condenser 58 shown in drawing 20 (a) shows the case where the plate is used, the substage condenser 58 shown in drawing 20 (b) shows the case where the spherical surface is being carried out. The lens is arranged in each part article divided into the hexagon, the natural light is condensed with a lens, and light is outputted to a fiber bundle 52.

[0076] In addition, the system shown in drawing 20 cannot be used at night. Therefore, it is necessary to prepare the light source 50 as shown in drawing 1 for the interior of the image display system 100. Moreover, to use the substage condenser 58 as shown in drawing 20 , the switch machine for switching with the light source 50 in the interior is required. Or you may have the synthetic vessel which compounds the light from a substage condenser 58, and the light from the light source 50 instead of the switch machine.

[0077] Drawing 21 is drawing showing an application in case an image display system is constituted by the module 900, as shown in drawing 18 . In drawing 21 , the case where two or more modules 900 are arranged at head lining and a wall is shown. A supple screen can be constituted by arranging a module 900 freely according to the size of head lining, the size of a wall, etc. Moreover, it becomes possible like drawing 21 to display the aperture of imagination, and the empty of imagination by arranging a screen in head lining or a wall. For example, space in which a vision person is present can be carried out just like the cottage of the beach by displaying the seashore with the screen arranged in the wall, and displaying the blue sky of summer with the screen arranged on the head lining. Moreover, you may make it only emit light, without displaying an image. The function as lighting fitting can be achieved by displaying the light only irradiated from the light source on a screen, without displaying an image according to the adjustment device which is not illustrated, since the liquid crystal panel has the function which can control the amount of the passing light by the driving signal. Like drawing 20 mentioned above, when the natural light is taken in with a substage condenser 58, the natural light can be taken in in the room. Moreover, when using as lighting fitting, you may make it remove a screen. As mentioned above, it is possible to use a quartz fiber and a plastics fiber as a fiber 54 which constitutes a fiber bundle 52, but ultraviolet rays can be removed when using a plastics fiber. Therefore, even when irradiating into the room the light and the natural light which were emitted from the light source, a safe light which omitted ultraviolet rays can be supplied by using a plastics fiber.

[0078] Drawing 22 is drawing showing the application of further others. The case where a display screen is made foldable is shown in drawing 22 . Moreover, the case where a screen is made into a concave is shown. It becomes easy to move by folding up a screen like a folding screen. Moreover, a storing location can be saved. Moreover, a powerful image can be offered by enabling it to approach in some screens to a vision person.

[0079] Drawing 23 shows the case where the module 900 curves inside. When the screen of a module 900 curves to a vision person, the wide screen of whenever [maximum angle-of-visibility / of a vision person] can be offered.

[0080] Drawing 24 shows further the case where the screen is carrying out the dome mold. Drawing 25 and drawing 26 are drawings showing the module in the case of constituting a dome mold screen. It is desirable for the partial screens 1a, 1b, 1c, and 1d in the case of constituting a dome mold screen and ... to carry out the hexagon. By carrying out the hexagon, it becomes easy to constitute the screen of a dome mold. Drawing 26 is drawing showing a liquid crystal module when the partial image is carrying out the hexagon. When the partial image is carrying out the hexagon, the liquid crystal panel 34 is also carrying out the hexagon, and the end face of a fiber optic cable 53 is also made into a hexagon. Thus, according to the configuration of a screen, it becomes possible by doubling the configuration of a liquid crystal panel or a fiber optic cable to perform useless image generation which is not in the use effectiveness of light.

[0081] As mentioned above, in this invention, one image consists of two or more partial images, and each partial image is respectively created with a liquid crystal module. It becomes unnecessary therefore, to use the Fresnel lens and lenticular plate which were used in order to receive horizontally and to raise main gain like the conventional liquid crystal projection TV which was creating the big screen using one liquid crystal panel. Although it is prepared in order that a Fresnel lens and a lenticular plate may correct the core of a large-sized image, and the imbalance of the vision property in a circumference part as mentioned above The partial image size to which the modularization of this invention was carried out For example, it is the thing of the range of 10 inches - 20 inches, and in displaying an image using a liquid crystal panel to a partial screen of this level, it is necessary to use neither a lenticular plate nor a Fresnel lens, and the cost of a screen itself becomes cheap. In this example, a screen should just be a removable panel containing a diffusion material.

[0082] In addition, although the case where light was supplied to all the liquid crystal modules in a system using the one light source was explained, you may make it give two or more light sources 50 in one system in the example mentioned above. That is, you may make it each of two or more light sources supply light to two or more liquid crystal modules. For example, if the number of two pieces and liquid crystal modules is made into eight pieces for the number of the light sources, all the two light sources may supply light to eight liquid crystal modules, and you may make it each light source supply light to four liquid crystal modules. The big description of this invention is a point which supplies light from at least one light source to two or more liquid crystal modules, and the relation that two or more liquid crystal modules which supply light from the one light source exist to at least one light source should just have it.

[0083] Drawing 27 is drawing showing the example of the image display structure of a system equipped with two or more light sources and two or more liquid crystal modules. In drawing, 50f is ultraviolet and an infrared cutoff filter. The light from the one light source 50 branches, and supplies light to two or more liquid crystal modules. Thus, even when two or more liquid crystal modules constitute a large-sized image display system by having two or more light sources, sufficient light to obtain a clear image can be supplied.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the image display system which used two or more liquid crystal panels. It is related with the image display system of the modular mold which divides and displays one image especially.

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PRIOR ART

[Description of the Prior Art] There was big screen CRT (cathode Rey tube) equipment as shown in drawing 28 as equipment which displays a large-sized image conventionally. In drawing 28 , the screen 1 has the size of 37 inches. Since CRT3 is used for this display, it has big depth D. Thus, since CRT3 is used, it is difficult to be unable to make depth D sufficiently small but to offer a thin display using CRT.
[0003] Drawing 29 is the large-sized display panel which used the conventional fluorescent indicator tube. A fluorescent indicator tube displays the color of three colors of R, G, and B, respectively, and is installed in the hall in which the public, such as a baseball field and a racetrack, gathers.
[0004] Drawing 30 is drawing showing the configuration of the projection TV of the reflective type tooth-back projection mold shown in the "color liquid crystal display" (display technical series, Shunsuke Kobayashi, Sangyo Tosho Publishing, P203). Drawing 31 is cross-section structural drawing of the screen 1 of projection TV as shown in drawing 30 . Similarly cross-section structural drawing of drawing 31 is shown in P205 of a "color liquid crystal display" shown above. Although projection TV as shown in drawing 30 can generate a large-sized image 40 inches or more, as shown in drawing 31 , it will have to use the lenticular plate 1002 and Fresnel lens 1001 for a screen, and will become very expensive equipment. Fresnel lens 1001 and the lenticular plate 1002 are raising the horizontal vision property by using in order to make high main gain to the vision person of projection TV, and taking structure as a screen 1 shows to drawing 31 . Moreover, although not illustrated, it has the filter for omitting the ultraviolet rays of the light emitted from the light source.
[0005] Drawing 32 shows the display which divides four screens for one screen and displays an image. Drawing 33 shows the internal structure. Respectively corresponding to the divided partial screens 1a-1d, the projection lenses 2a-2d and CRT 3a-3d are formed. A distributor 4 outputs picture signal Ia-Id which inputted the picture signal I, divided the picture signal into one fourth, and was divided, respectively to CRT 3a-3d. In partial screen 1a-1d, boundaries L1 and L2 exist and removal of these boundaries L1 and L2 has been a technical problem.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The display using large-sized CRT shown in drawing 28 could not make depth D small, but had the fault that equipment was not made into a thin shape. Moreover, since the image was generated using one CRT, only the about 37 inches [a maximum of] image was made, and a big image was not able to be generated any more.
[0007] Moreover, the display system using the fluorescent indicator tube shown in drawing 29 had the fault that the fluorescent indicator tube which failure generated whenever the fluorescent indicator tube broke down had to be exchanged. Especially the activity of exchanging a fluorescent indicator tube with failure since it is attached in heights, such as a baseball field and a racetrack, was an activity which spends time amount with risk.
[0008] Moreover, although the conventional projection TV shown in drawing 30 and drawing 31 was attaining thin shape-ization by reflecting an optical path inside a cabinet, it was not able to attain thin shape-ization enough, so that it used by one domestic room. Moreover, in order to raise main gain, the screen is having special structure which used the Fresnel lens and the lenticular plate, and could not but become what has the expensive price of equipment. Moreover, the Fresnel lens and the lenticular plate interfered mutually and there was a fault of producing pinstriped moire.
[0009] Moreover, the display using two or more small CRT shown in drawing 32 and drawing 33 had the fault that boundaries L1 and L2 will be made to the divided partial screens 1a-1d. Moreover, although small CRT 3a-3d was used, depth D of small CRT could not be made sufficiently small, and thin shape-ization of equipment was not able to be attained.
[0010] Moreover, since CRT was used for the conventional display or the fluorescent indicator tube was used for it, it had the fault that own weight of equipment became large. Therefore, once it installed, it could be hard to say that the display system is carried easily, and is carried out, or is moved.
[0011] This invention is made in order to solve the above troubles, and it aims at obtaining the image display system which can generate a large-sized image.
[0012] Moreover, this invention aims at obtaining a sufficiently available image display system also in the tooth space of the thin and domestic room.
[0013] Moreover, this invention aims at obtaining the movable image display system which made weight of equipment light.
[0014] Moreover, this invention aims at obtaining the image display system of a low price.
[0015] Moreover, this invention aims at obtaining the scalable image display system which can change the whole screen configuration while it can change the size of a screen.
[0016] Moreover, this invention aims to let a maintenance obtain an easy image display system, when it breaks down.

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MEANS

[Means for Solving the Problem] The image display system concerning this invention has the following elements.
(a) The screen which displays the partial image generated from two or more liquid crystal modules and the liquid crystal module of the (b) above-mentioned plurality which generate the partial image which is equipped with a liquid crystal panel and constitutes some images, the optical feed zone which supplies light to the liquid crystal panel of the liquid crystal module of the (c) above-mentioned plurality.
[0018] The above-mentioned liquid crystal module is characterized by having the projection lens which compounds the light outputted from the liquid crystal panel for colors, the liquid crystal panel for brightness, and the liquid crystal panel for colors and the liquid crystal panel for brightness.
[0019] The above-mentioned liquid crystal module is characterized by having the polarization beam splitter which distributes further the light supplied from the optical feed zone to the above-mentioned liquid crystal panel for colors, and the liquid crystal panel for brightness.
[0020] The above-mentioned liquid crystal module is characterized by having further the reflecting plate united with the polarization beam splitter.
[0021] The above-mentioned liquid crystal module is characterized by having arranged to a screen and parallel while it arranges the optical supply edge, the above-mentioned polarization beam splitter, and the above-mentioned reflecting plate to the above-mentioned liquid crystal module of the above-mentioned optical feed zone to a serial.
[0022] The above-mentioned liquid crystal module is characterized by having had the projection lens which projects the image generated with the liquid crystal panel, and having a reflective mirror between a screen and a projection lens.
[0023] The above-mentioned screen is characterized by being one panel containing a diffusion material.
[0024] The above-mentioned panel is characterized by being installed free [attachment and detachment].
[0025] The above-mentioned panel is characterized by being installed possible [rolling up].
[0026] The above-mentioned screen is characterized by being the concave screen with which the center section extended far back.
[0027] The above-mentioned screen is characterized by being a dome mold screen.
[0028] The above-mentioned screen is characterized by consisting of two or more partial screens formed corresponding to two or more liquid crystal modules.
[0029] The above-mentioned partial screen is characterized by being a hexagon.
[0030] at least one light source to which the above-mentioned optical feed zone emits light to two or more liquid crystal modules, and above -- even if few, it is characterized by having the distribution section which distributes the light emitted from the one light source to two or more above-mentioned liquid crystal modules.
[0031] the above-mentioned distribution section -- the above -- even if few, it is characterized by having two or more fiber optic cables which distribute the light from the one light source to each liquid crystal module.

[0032] The above-mentioned fiber optic cable is characterized by having a plastics fiber.
[0033] The above-mentioned fiber optic cable is characterized by consisting of two or more fibers.
[0034] Two or more above-mentioned fibers are characterized by being knit at random.
[0035] The above-mentioned fiber optic cable is characterized by constituting a polygon from an end face by the side of a liquid crystal module with two or more fibers.
[0036] The polygon of the end face by the side of the liquid crystal module of the above-mentioned fiber is characterized by being the panel configuration of a liquid crystal panel, and similarity.
[0037] The above-mentioned optical feed zone is characterized by having further the substage condenser which condenses and outputs a surrounding light.
[0038] The above-mentioned image-display system is equipped with the signal-processing section which generates further the partial picture signal which generates a partial image to each liquid-crystal module, and the above-mentioned signal-processing section is characterized by to have two or more processor sections which input a picture signal, and choose and output the partial picture signal corresponding to each liquid-crystal module from the bus which transmits a picture signal, and the above-mentioned bus formed corresponding to each liquid-crystal module.

[0039] The above-mentioned processor section is characterized by having further the amendment circuit which amends the above-mentioned partial picture signal based on the display property of each liquid crystal module.
[0040] The above-mentioned amendment circuit is characterized by amending the display property of each liquid crystal module so that it may be in agreement with the criteria property that the electrical potential difference to a liquid crystal module is proportional to the optical output from a liquid crystal module.
[0041] The above-mentioned processor section changes a partial picture signal into the signal which used the technique of area gradation, and the above-mentioned liquid crystal panel is characterized by generating a partial image using the technique of area gradation.
[0042] Further, it connects with the above-mentioned bus, the above-mentioned signal-processing section is equipped with the control section which directs the partial picture signal which should be chosen to two or more above-mentioned processor sections, and the above-mentioned processor section is characterized by choosing the partial picture signal directed by the above-mentioned control section.
[0043] The above-mentioned image display system is characterized by having the cabinet which arranges the liquid crystal module of further the above-mentioned plurality removable, and installs it.
[0044] While the above-mentioned cabinet attaches the above-mentioned liquid crystal module possible [modification of the distance of the above-mentioned liquid crystal module and a screen], the above-mentioned liquid crystal module is characterized by having the projection lens attached exchangeable and attaching the above-mentioned liquid crystal module possible [modification of the distance of a projection lens and a liquid crystal panel] between a screen and a liquid crystal panel.
[0045] The above-mentioned image display system is characterized by having the cutoff plate which intercepts the light outputted to the boundary of the partial image display further displayed on a screen adjacently from a liquid crystal module.
[0046]
[Embodiment of the Invention] Drawing 1 is drawing showing an example of the image display system of this invention. In drawing 1 , in order to display a internal structure, the screen 1 shows the condition of being rolled round by the upper part of a cabinet 10. Or a screen 1 may be installed dismountable. When an image is actually displayed, a screen 1 is a wrap about the image display system 100 whole. In the example shown in drawing 1 , the liquid crystal module 20 is arranged in the array of 3x3 at the cabinet 10. The projection lenses 21 and 22 are formed in each liquid crystal module 20. The image projected from the projection lenses 21 and 22 is compounded, and is projected from behind a screen 1. The control section 300 is formed in the

interior of a cabinet 10, and the image display system 100 whole is controlled. Moreover, only the one light source 50 is formed in the interior of a cabinet 10. The light emitted from the light source passes an integrator 51, and is divided by the fiber optic cable 53 through the cable bundle 52. An integrator 51 makes light from the light source 50 homogeneity. A fiber optic cable 53 supplies the light divided to each liquid crystal module 20. The gobo 60 prepared in the intervals of each liquid crystal module 20 is sheet metal for the light from each liquid crystal module to interfere mutually with the light from other liquid crystal modules, and not suit.

[0047] Drawing 2 is the A-A sectional view of the image display system shown in drawing 1 . The rolling-up shaft 12 for rolling round a screen 1 exists in a cabinet 10. the motor which is not illustrating the rolling-up shaft 12 — or it is a shaft for rolling round a screen 1 with hand control. The bar 13 has the function for carrying out alignment of the screen 1 to the front face of the image display system 100. Two or more installation sections 11 exist in the cabinet 10, and the liquid crystal module 20 can be attached in a cabinet by the installation section 11. Installation of the installation section 11 and the liquid crystal module 20 is performed by the well-known attachment-and-detachment device which used the screw and the magnet. Moreover, a gobo 60 is put in the installation section 11 removable. This gobo 60 is for making it the light from each liquid crystal module not interfere with light with other liquid crystal modules. For example, in drawing 2 , since the light shown by the dotted line is intercepted with a gobo 60, it is useful to not interfering with the light from other liquid crystal modules, and generating a clear image. As the thickness of a gobo 60 is thin, it is better. For example, it is desirable to use a black griddle with the thickness of about 0.1-0.2mm. When the thickness of a gobo 60 becomes thick, the shadow of a gobo will be generated to a screen. In the case of 0.1mm - 0.2mm thickness, it becomes the range which does not do a bad influence at all to an image, without generating the shadow of a gobo to a screen.

[0048] The projection lenses 21 and 22 are arranged at the liquid crystal module 20. On a screen, the light from the projection lenses 21 and 22 overlaps, and is projected. Moreover, a fiber optic cable 53 is connected to the liquid crystal module 20. The optical module 30 by which the modularization was further carried out to the interior exists in the liquid crystal module 20. The lens 31, the polarization beam splitter 32, and the reflective mirror 33 are arranged by the optical module 30 at the serial. In the side face of a polarization beam splitter 32, the liquid crystal panel 34 for colors is arranged. In the side face of the reflective mirror 33, the liquid crystal panel 35 for brightness is arranged. The arrangement location of the liquid crystal panel 34 for colors has a direction more desirable than the liquid crystal panel 35 for brightness near the light irradiated from a fiber optic cable 53. It is for strengthening the optical output of the liquid crystal panel for colors as much as possible. For example, when arrangement of the liquid crystal panel for colors and the liquid crystal panel for brightness is made reverse, it is desirable for reflection of the reflective mirror 33 to arrange the liquid crystal panel 34 for colors on the side face of a polarization beam splitter 32, since not total reflection but an optical output will be able to weaken.

[0049] As shown in drawing 2 , while arranging a fiber optic cable 53, a lens 31, a polarization beam splitter 32, and the reflective mirror 33 to a serial, depth D of equipment can be made small by arranging two or more components arranged at this serial to a screen and parallel. when size of the liquid crystal panel 34 for colors and the liquid crystal panel 35 for brightness is made into an about 0.7 inches thing, the depth D0 of the optical module 30 is in ** — it is good at about 1 inch of **. Since the part which generates an image is settled in about 1 inch, very thin equipment can be offered compared with the display using the conventional CRT. For example, when the 0.7 inches liquid crystal panels 34 and 35 are used, it is possible to set depth D of the image display system 100 whole to about 20cm.

[0050] Drawing 3 is drawing showing the detail of the fiber optic cable shown in drawing 1 and drawing 2 . The cable bundle 52 is constituted by the fiber 54. As shown in drawing 1 , to divide and supply light to nine liquid crystal modules, nine fiber optic cables 53 are required. For example, a fiber optic cable 53 is constituted by packing 12 fibers into one cable. Therefore, all the numbers of a fiber 54 become [9x12=108]. That is, the cable bundle 52 consists of 108 fibers 54. The end-face configuration by the side of the light source of the cable bundle 52 is

circular. Since the light source 50 is equipped with reflecting mirrors, such as a paraboloid-of-revolution mirror or a rotation ellipse mirror, the cross section of the light emitted from the light source 50 is carrying out the round shape. In order to absorb this light efficiently, as for the cross section of an integrator 51, and the cross section of the cable bundle 52, it is desirable to carry out the round shape. In addition, in the above-mentioned explanation, although a configuration is simplified and all the numbers of a fiber are made into 108, the number of a fiber is the need about 7000-10,000 in fact, in order to equalize optical intensity distribution. Or although based also on the size of a fiber, a fiber cable may consist of tens of thousands of fibers. On the other hand, as for the end face of a fiber optic cable 53, it is desirable to carry out the same configuration as a liquid crystal panel. For example, it is desirable for the end face of a fiber optic cable 53 to carry out [the aspect ratio] the rectangle of 3:4 similarly, when the liquid crystal panel 34 for colors is carrying out the configuration of 3:4. When the end face of a fiber optic cable 53 is carrying out the rectangle of 3:4, the light emitted from a fiber optic cable 53 is used as it is that there is no futility in a liquid crystal panel 34.

[0051] Since according to this example the circular flux of light was rearranged according to the array of the fiber 54 in the interior of a fiber optic cable and the flux of light with a circular cross section generated from the light source in the display using the usual liquid crystal panel has changed it into the rectangle although a perimeter part will be cut and it will produce futility when it is irradiated by the liquid crystal panel in which the rectangle carried out the configuration, it does not become useless. Since 12 fibers 54 are used in order to simplify explanation, and one fiber optic cable 53 is constituted from this example, the flux of light with the same aspect ratio of 3:4 as a liquid crystal panel is generable by arranging a fiber 54 to 3x4. Or thousands of to tens of thousands of fibers may be arranged to the integral multiple of 3x4. Moreover, the flux of light which has the aspect ratio of 3:4 in the cable of the rectangle in which an end face has the aspect ratio of 3:4 by holding a fiber may be generated. Even if it is the case where a fiber optic cable 53 cannot make the aspect ratio of a liquid crystal panel, and the same aspect ratio, the flux of light of the aspect ratio same as a result as a liquid crystal panel is generable by changing an aspect ratio with a lens 31. For example, what is necessary is to constitute the square of 3x3, to double 4/3 in a longitudinal direction with a lens 31, to generate the flux of light of the rectangle of 3:4, and just to irradiate a liquid crystal panel 34, when the fiber optic cable 53 consists of nine fibers 54.

[0052] Although the cable bundle 52 consists of two or more fibers 54 as mentioned above, it can make homogeneity light outputted from a fiber optic cable 53 by knitting a fiber 54 at random inside the cable bundle 52. When it has arranged straight, without knitting an optical fiber 54 within the cable bundle 52, the part toward which the light emitted from the light source 50 inclined will be outputted to the specific fiber optic cable 53. In the cross-section part, the light from the light source 50 has strength, and is not uniform. For example, in the central part of the flux of light, a powerful light is emitted and the taper is emitted in the circumference part. When light is outputted to a direct fiber optic cable from these parts, the light which inclined for every fiber optic cable will be irradiated by the liquid crystal panel as it is. Therefore, the image generated will also be able to do nonuniformity. However, like this example, by knitting fiber 54 ** at random and uniting it, the light outputted from two or more fiber optic cables 53 becomes uniform, and serves as an image in which the image generated with a liquid crystal panel as a result does not have variation, either.

[0053] Moreover, it becomes unnecessary to use the integrator 51 shown in drawing 1 by knitting a fiber 54 at random and setting it. An integrator 51 is used in order to make into homogeneity light emitted from the light source 50, but as mentioned above, since [that a fiber is random] it knits, unites and is alike and equalization of an optical output can be attained more nearly similarly, it becomes unnecessary [an integrator 51].

[0054] Use of a quartz fiber and a plastics fiber can be considered as a fiber 54. If a plastics fiber is used, since ultraviolet rays can be omitted, the filter which omits ultraviolet rays from the light from the light source 50 becomes unnecessary.

[0055] As shown in drawing 1 , the big description of this image display system 100 is the point of having the one light source to two or more liquid crystal modules 20. The cost of equipment

can be reduced while the whole equipment lightweight-izes light from the one light source by supplying light to two or more liquid crystal modules using a fiber optic cable. Moreover, a maintenance is [that what is necessary is just to exchange lamps] easy when failure arises on the lamp of the light source.

[0056] moreover, the thing for which a screen 1 is wound up even when a certain failure occurs to the liquid crystal module 20, as shown in drawing 1 and drawing 2 — or by removing a screen 1, the liquid crystal module 20 can be taken out from the front face of the image display system 100, and it can maintain easily. When the cause of failure of the liquid crystal module 20 is not known, it is also possible to exchange the liquid crystal module 20 in a site. Moreover, exchange of the lamp of the light source mentioned above can also be performed from the front face of the image display system 100. Moreover, since a gobo 60 can also be taken out and inserted, a maintenance is still easier. Moreover, the liquid crystal panel is lightweight compared with CRT, and the liquid crystal module 20 is lightweight compared with CRT. Moreover, the image display system 100 whole can be made lightweight that what is necessary is just to also have the one light source.

[0057] Drawing 4 is drawing showing the configuration of the signal-processing section of the image display system shown in drawing 1 . Although not illustrated to drawing 1 and drawing 2 , the processor section 220 is arranged at each liquid crystal module 20, respectively. Each processor section 220 is connected by the bus 210. The bus 210 is further connected to the control section 300. A control section 300 outputs the control signal which controls the processor section to a bus 210 while outputting the picture signal which inputted the picture signal I and was inputted from the exterior to a bus 210. Each processor section 220 generates driving signals C and Y from the partial picture signal which extracted and extracted the partial picture signal based on the control signal outputted from the control section, and outputs them to the liquid crystal panel 34 for colors, and the liquid crystal panel 35 for brightness while it inputs the picture signal outputted from the control section.

[0058] The coding section (COD) 310, memory 320, CPU330, and the partial image specification part 340 exist in a control section 300. The partial image specification part 340 grasps the image display structure of a system, and specifies the partial image which should be extracted to each processor section 220 based on the image display structure of a system. For example, when the image of a certain image display system consists of four partial images, it is specified that it extracts one fourth of images to each processor section. Or when an image consists of nine partial images, it is specified that it extracts one ninth of images to each processor section. Moreover, it specifies which part of an image should be extracted to each processor section. Each processor section is programmed to be able to extract the partial image of the range specified by the partial image specification part 340. Since this partial image specification part 340 exists, even when the image division specification of an image display system is changed, in the processor section, modification of what is also unnecessary, and it can respond to specification modification flexibly. Thus, since the processor section can extract the partial image specified by the partial image specification part 340, when the case where the size of an image display system is changed, the number of arrays, and a configuration are changed, it is not necessary to change any of each processor section, and an image can be displayed.

[0059] The coding section 310 of a control section 300 inputs a picture signal I, and outputs it to a bus 210 by making the signal into a digital sign. The picture signal outputted to a bus is a picture signal for one screen. Each processor section inputs only the partial image specified by the partial image specification part 340, respectively, as mentioned above.

[0060] CPU230, memory 240, the decode section (DEC) 250, and the amendment circuit 260 exist in each processor section 220. The decode section 250 decodes the picture signal inputted from the bus 210. While managing decode processing of the decode section 250, CPU230 specifies only a partial image required for the processor section to display, and is made to decode, as mentioned above. The amendment circuit 260 is a circuit which amends driving signals C and Y in order to make the property of two or more liquid crystal panels in agreement with a criteria property.

[0061] Drawing 5 is drawing showing the property of a liquid crystal panel. In drawing 5 , an axis

of abscissa shows the electrical potential difference V of driving signals C and Y, and the axis of ordinate shows the reinforcement P of the optical output outputted from a liquid crystal panel. There is a property of a proper in a liquid crystal panel for every liquid crystal panel. In drawing 5 , two properties, X1 and X2, are shown. For example, when the electrical potential difference of a driving signal is 4V, to the reinforcement of an optical output being P1 according to the property X1, according to the property X2, luminous intensity is P2 and both have a difference (P1 !=P2). When this difference exists, a different output for every partial image will be carried out. In order to keep the same the adjacent degree and the brightness of a color of a partial image, the property of a liquid crystal panel must be uniform. The amendment circuit 260 is a circuit for making a property X1 and a property X2 as shown in drawing 5 in agreement with one criteria property.

[0062] Drawing 6 is drawing explaining actuation of the amendment circuit 260. In drawing 6 , the straight line from P0 to P7 is the criteria property S. Drawing 7 is drawing showing the configuration of the amendment circuit 260. ROM261 inputs the digital driving signal IN before amendment, and outputs the digital driving signal OUT after amendment. A digital-analog converter 262 changes the digital driving signal OUT after amendment into the driving signal C of an analog.

[0063] Drawing 8 is the amendment table memorized inside ROM261. ROM261 inputs the digital driving signal IN before amendment, and searches and outputs the digital driving signal OUT after amendment from the amendment table shown in drawing 8 . For example, as shown in drawing 6 , when the electrical potential difference of a driving signal is 4V, according to the property X1, the reinforcement of an optical output is P1, but as for the criteria property S, P3 is shown. According to the property X1, in order to output the reinforcement P3 of an optical output, the driving signal of 4.5V is needed. Therefore, as shown in drawing 8 , when there is an input of 4V, the reinforcement of an optical output can be changed into P3 from P1 by outputting 4.5V. The reinforcement of an optical output can be set to P3 to the driving signal of 4V by using the same amendment table also to a property X2. What is necessary is just to change the driving signal of 4V into the driving signal of 4.4V, in order to consider as the reinforcement P3 of an optical output when there is an input of 4V to a property X2 as shown in drawing 6 . When there is an input of 4V to properties X1 and X2, thus, conventionally As the reinforcement of an optical output shows drawing 5 , it is P1 and P2, and to there having been a difference, in this example, both the reinforcement of an optical output called P3 can be obtained, and the degree and brightness of a color of an image which are generated from a liquid crystal panel can be made into homogeneity also in a property X1 or a property X2. In drawing 6 , the criteria property S shows the case where the reinforcement P of an optical output increases proportionally by change of the electrical potential difference V of a driving signal. Thus, it is the role of the amendment circuit which giving linear relation between the electrical potential difference V of a driving signal and the reinforcement P of an optical output mentioned above. That is, it is the role of the amendment circuit which changing the electrical potential difference of a driving signal so that the property which each liquid crystal panel has may be doubled with this criteria property mentioned above. In addition, the amendment circuit using ROM261 shown in drawing 7 and drawing 8 is an example, and it is possible to amend the property of each liquid crystal panel similarly using other circuits or other software.

[0064] Drawing 9 shows the example which formed the area gradation processing section 270 instead of the amendment circuit 260 of the processor section 220 mentioned above. It is necessary to amend the property of a liquid crystal panel because there was the same property part which cannot carry out an optical output to the electrical potential difference V of a driving signal as shown in drawing 5 . If the optical output of each property displays an image like [in the case of being 10V] only using the electrical potential difference which surely becomes equal when the electrical potential difference V of the driving signal shown in drawing 5 is 0V and, it will become unnecessary then, to amend the electrical potential difference V of a driving signal. That is, by using a liquid crystal panel in the state of either ON or OFF, even if properties differ between liquid crystal panels, it can be used satisfactory at all. The area gradation processing section 270 displays an image only using the case where the electrical potential difference V of

the driving signal shown in drawing 5 is 0V, and the case where it is 10V. That is, image display is carried out using binary [of ON or OFF].
[0065] Drawing 10 is drawing showing the various binary-ized technique for the gradation reappearance shown in "imaging" (the edited by Society of Electrophotography of Japan, January 20, Showa 63 issue, P31). The area gradation processing section 270 expresses neutral colors (gradation) with binary using one technique of the binary-ized technique as shown in drawing 10 .
[0066] Drawing 11 is drawing showing an example of an image display system with the array of 4x4. When one screen consists of 1024x1280 dots, a partial image consists of 256x320 dots. Moreover, the size of a partial image is 17.5 inches and the size of a whole image is 17.5x4=70 inch. 81,920x16=1,310,720 dot can be displayed by the thing which displays 256x320=81,920 dot, then the whole using a 0.7 inches liquid crystal panel. When displaying the image of 640x320 dots of one image using area gradation, using this number of pixels, what is necessary will be to become 1,310,720/(640x320) =6.4 dot, and just to display 1 pixel by about 6 dots. In this example, although the case of 4x4 is shown, if the size of this array becomes still larger, the number of dots which can be used for 1 pixel can be increased further, and it will become possible to perform more advanced gradation processing of 16 gradation or 32 gradation.
[0067] Drawing 12 is drawing showing other examples of the image display system of this invention. A different point in the configuration shown in drawing 12 and the configuration shown in drawing 2 is a point of using the projection lenses 21a and 22a with which focal distances differ instead of the projection lenses 21 and 22. When the focal distance of a projection lens is changed, the distance D1 from a projection lens to a screen 1 and the distance D2 from a projection lens to a liquid crystal panel must be changed. Then, the liquid crystal module 20 is attached in the direction of arrow heads A1 and A2 possible [a slide] to a mount 11. Moreover, the optical module 30 is attached in the direction of an arrow head B1 and B-2 possible [a slide] to a liquid crystal module. Thus, even when a projection lens is exchanged by attaching a liquid crystal module and an optical module possible [a slide], this image display system 10 is able to correspond flexibly. In addition, especially structure where the liquid crystal module 20 and the optical module 30 are attached possible [a slide] can be performed using a well-known sliding mechanism etc., although not shown in drawing 12 . Moreover, justification by these slides can be performed from the front face of the image display system 100 by sampling a gobo 60 by winding up a screen 1 again.
[0068] As mentioned above, the gobo 60 is attached in the mount 11 at extraction-and-insertion freedom. By extracting a gobo 60, the installation and the maintenance of a liquid crystal module or an optical module which were mentioned above become easy. Moreover, it becomes easy to exchange, when gobo 60 the very thing is damaged.
[0069] Drawing 13 is drawing showing other examples of the liquid crystal module 20. The point that the liquid crystal module 20 shown in drawing 13 differs from the liquid crystal module shown in drawing 2 is a point of using total reflection plate 33a, instead of the reflective mirror 33. Although loss of the light by the reflective mirror 33 occurs when using the reflective mirror 33 shown in drawing 2 , total reflection plate 33a shown in drawing 13 is a reflecting plate using a refractive index, and carries out total reflection of the inputted light. Therefore, there is no loss of the light by reflection. It unites with a polarization beam splitter 32, and total reflection plate 33a can be made the configuration which carried out the modularization of the total reflection plate 33a to the polarization beam splitter 32 easily by fabricating a polarization beam splitter 32 and total reflection plate 33a on both sides of the matter of a refractive index n.
[0070] Drawing 14 is drawing showing other examples of the liquid crystal module 20. In drawing 14 (a), the example which uses two polarization beam splitters 32 and 36 is shown. 71-74 are reflective mirrors which form an optical path. A polarization beam splitter 36 compounds the image from two liquid crystal panels 34 and 35. Therefore, the number of projection lenses is one sufficient. On the other hand, the example shown in drawing 14 (b) shows the example which has arranged the liquid crystal panel perpendicularly to the polarization beam splitter 32. In addition, although not illustrated especially, the case where the liquid crystal panel for colors of one sheet only exists in a liquid crystal module not only in when two liquid crystal panels, the liquid crystal

panel for colors and the liquid crystal panel for brightness, exist is sufficient. Or the liquid crystal panel for colors of three sheets which displays each of R, G, and B may exist in the liquid crystal module. Furthermore, the case where the liquid crystal panel of four sheets which displays R, G, B, and Y, respectively exists is sufficient.

[0071] Drawing 15 is drawing showing an example of an image display system which used the reflective mirror 70. It is reflected by the reflective mirror 70 and the light projected from the projection lens 21 is projected behind a screen. When the reflective mirror 70 exists, it becomes possible to make depth D of an image display system still smaller. Furthermore, since the reflective mirror itself can shade the light which comes from other liquid crystal modules when the reflective mirror 70 exists, the gobo 60 which was mentioned above is omissible. However, an omissible gobo is only a gobo placed in the vertical direction, and the gobo put on right and left is required.

[0072] Drawing 16 is drawing showing other examples of the image display system of this invention. In drawing 1 and drawing 2 , although the liquid crystal module existed independently for every partial image, when shown in drawing 16 , it is going to constitute an image display system by arranging each part articles, such as a projection lens and a liquid crystal panel, to an array plate for every components. That is, the projection lenses 21 and 22 are arranged to the projection lens array plate 400. Moreover, liquid crystal panels 34 and 35 are arranged to the liquid crystal panel array plate 500. Moreover, a polarization beam splitter 32 and the reflective mirror 33 are arranged to the array plate 600. Furthermore, a lens 31 is arranged to the lens array plate 700. A fiber optic cable 53 is arranged to the fiber optic cable array plate 800. Thus, each arranged array plate is arranged with predetermined spacing to the cabinet 10 shown in drawing 17 . When maintaining each array plates 400–800, it can carry out by taking out each array plate by opening the side panel (not shown) of a cabinet 10 and making each array plate slide along a slot 99.

[0073] Drawing 18 is drawing showing other examples of the image display system of this invention. In the example mentioned above, although the case where the screen consisted of one panel was explained, the case where the screen itself is divided partially is shown in this example. The modularization of the image display system can be carried out by dividing a screen into the partial screens 1a, 1b, and 1c and ... When shown in drawing 18 , the case where it consists of 3x4=12 piece modules 900 is shown.

[0074] Drawing 19 is drawing showing the B–B cross section of the module shown in drawing 18 . It can dissociate with other modules and actuation of each module 900 is attained as some screens by connecting a module 900 with a fiber optic cable 53 and the bus 210 which is not illustrated. As mentioned above, it becomes possible to display the partial image with which each module 900 was specified by the processor section 220 which is not illustrated existing in the interior of a module 900, and specifying the partial image which a control section 300 should display to this processor section 220 through a bus 210.

[0075] Drawing 20 is drawing showing other examples of the light source of this invention. In the example mentioned above, although the case where light was emitted and used from the light source 50 was explained, when shown in drawing 20 , the natural light (sunlight) is condensed with a substage condenser 58, and the case where light is supplied to the image display system 100 by which the collection–and–delivery section 59 has been arranged in each part store is shown. Since the light condensed by using the natural light is a parallel ray, it becomes possible to generate a clearer image. Although the substage condenser 58 shown in drawing 20 (a) shows the case where the plate is used, the substage condenser 58 shown in drawing 20 (b) shows the case where the spherical surface is being carried out. The lens is arranged in each part article divided into the hexagon, the natural light is condensed with a lens, and light is outputted to a fiber bundle 52.

[0076] In addition, the system shown in drawing 20 cannot be used at night. Therefore, it is necessary to prepare the light source 50 as shown in drawing 1 for the interior of the image display system 100. Moreover, to use the substage condenser 58 as shown in drawing 20 , the switch machine for switching with the light source 50 in the interior is required. Or you may have the synthetic vessel which compounds the light from a substage condenser 58, and the light

from the light source 50 instead of the switch machine.
[0077] Drawing 21 is drawing showing an application in case an image display system is constituted by the module 900, as shown in drawing 18 . In drawing 21 , the case where two or more modules 900 are arranged at head lining and a wall is shown. A supple screen can be constituted by arranging a module 900 freely according to the size of head lining, the size of a wall, etc. Moreover, it becomes possible like drawing 21 to display the aperture of imagination, and the empty of imagination by arranging a screen in head lining or a wall. For example, space in which a vision person is present can be carried out just like the cottage of the beach by displaying the seashore with the screen arranged in the wall, and displaying the blue sky of summer with the screen arranged on the head lining. Moreover, you may make it only emit light, without displaying an image. The function as lighting fitting can be achieved by displaying the light only irradiated from the light source on a screen, without displaying an image according to the adjustment device which is not illustrated, since the liquid crystal panel has the function which can control the amount of the passing light by the driving signal. Like drawing 20 mentioned above, when the natural light is taken in with a substage condenser 58, the natural light can be taken in in the room. Moreover, when using as lighting fitting, you may make it remove a screen. As mentioned above, it is possible to use a quartz fiber and a plastics fiber as a fiber 54 which constitutes a fiber bundle 52, but ultraviolet rays can be removed when using a plastics fiber. Therefore, even when irradiating into the room the light and the natural light which were emitted from the light source, a safe light which omitted ultraviolet rays can be supplied by using a plastics fiber.
[0078] Drawing 22 is drawing showing the application of further others. The case where a display screen is made foldable is shown in drawing 22 . Moreover, the case where a screen is made into a concave is shown. It becomes easy to move by folding up a screen like a folding screen. Moreover, a storing location can be saved. Moreover, a powerful image can be offered by enabling it to approach in some screens to a vision person.
[0079] Drawing 23 shows the case where the module 900 curves inside. When the screen of a module 900 curves to a vision person, the wide screen of whenever [maximum angle-of-visibility / of a vision person] can be offered.
[0080] Drawing 24 shows further the case where the screen is carrying out the dome mold. Drawing 25 and drawing 26 are drawings showing the module in the case of constituting a dome mold screen. It is desirable for the partial screens 1a, 1b, 1c, and 1d in the case of constituting a dome mold screen and ... to carry out the hexagon. By carrying out the hexagon, it becomes easy to constitute the screen of a dome mold. Drawing 26 is drawing showing a liquid crystal module when the partial image is carrying out the hexagon. When the partial image is carrying out the hexagon, the liquid crystal panel 34 is also carrying out the hexagon, and the end face of a fiber optic cable 53 is also made into a hexagon. Thus, according to the configuration of a screen, it becomes possible by doubling the configuration of a liquid crystal panel or a fiber optic cable to perform useless image generation which is not in the use effectiveness of light.
[0081] As mentioned above, in this invention, one image consists of two or more partial images, and each partial image is respectively created with a liquid crystal module. It becomes unnecessary therefore, to use the Fresnel lens and lenticular plate which were used in order to receive horizontally and to raise main gain like the conventional liquid crystal projection TV which was creating the big screen using one liquid crystal panel. Although it is prepared in order that a Fresnel lens and a lenticular plate may correct the core of a large-sized image, and the imbalance of the vision property in a circumference part as mentioned above The partial image size to which the modularization of this invention was carried out For example, it is the thing of the range of 10 inches - 20 inches, and in displaying an image using a liquid crystal panel to a partial screen of this level, it is necessary to use neither a lenticular plate nor a Fresnel lens, and the cost of a screen itself becomes cheap. In this example, a screen should just be a removable panel containing a diffusion material.
[0082] In addition, although the case where light was supplied to all the liquid crystal modules in a system using the one light source was explained, you may make it give two or more light sources 50 in one system in the example mentioned above. That is, you may make it each of two

or more light sources supply light to two or more liquid crystal modules. For example, if the number of two pieces and liquid crystal modules is made into eight pieces for the number of the light sources, all the two light sources may supply light to eight liquid crystal modules, and you may make it each light source supply light to four liquid crystal modules. The big description of this invention is a point which supplies light from at least one light source to two or more liquid crystal modules, and the relation that two or more liquid crystal modules which supply light from the one light source exist to at least one light source should just have it.

[0083] Drawing 27 is drawing showing the example of the image display structure of a system equipped with two or more light sources and two or more liquid crystal modules. In drawing, 50f is ultraviolet and an infrared cutoff filter. The light from the one light source 50 branches, and supplies light to two or more liquid crystal modules. Thus, even when two or more liquid crystal modules constitute a large-sized image display system by having two or more light sources, sufficient light to obtain a clear image can be supplied.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing an example of the image display system of this invention.
[Drawing 2] It is drawing showing the side cross section of the image display system of this invention.
[Drawing 3] It is drawing showing the fiber optic cable of this invention.
[Drawing 4] It is drawing showing the signal-processing section of this invention.
[Drawing 5] It is drawing showing the property of the liquid crystal panel of this invention.
[Drawing 6] It is drawing explaining actuation of the amendment circuit of this invention.
[Drawing 7] It is drawing showing an example of the configuration of the amendment circuit of this invention.
[Drawing 8] It is drawing showing the amendment table of the amendment circuit of this invention.
[Drawing 9] It is drawing showing other examples of the processor section of this invention.
[Drawing 10] It is drawing showing the binary-ized technique in which the area gradation processing section of this invention uses.
[Drawing 11] It is drawing showing the example of the area gradation processing section of this invention.
[Drawing 12] It is drawing showing installation of the liquid crystal module of this invention.
[Drawing 13] It is drawing showing other examples of the liquid crystal module of this invention.
[Drawing 14] It is drawing showing other examples of the liquid crystal module of this invention.
[Drawing 15] It is drawing showing the image display system using the reflective mirror of this invention.
[Drawing 16] It is drawing showing the image display system using the array plate of this invention.
[Drawing 17] It is drawing showing the image display system using the array plate of this invention.
[Drawing 18] It is drawing showing the image display system using the module of this invention.
[Drawing 19] It is drawing showing the side cross section of the module of this invention.
[Drawing 20] It is drawing showing the image display system using the substage condenser of this invention.
[Drawing 21] It is drawing showing the flat screen of this invention.
[Drawing 22] It is drawing showing the fold-up formula screen of this invention.
[Drawing 23] It is drawing showing the in curve screen of this invention.
[Drawing 24] It is drawing showing the dome mold screen of this invention.
[Drawing 25] It is drawing showing the partial screen of the dome mold screen of this invention.
[Drawing 26] It is the block diagram of the liquid crystal module used for the dome mold screen of this invention.
[Drawing 27] It is drawing showing the image display system using two or more light sources of this invention.
[Drawing 28] It is drawing showing the image display device using the conventional CRT.
[Drawing 29] It is drawing showing the image display device using the conventional fluorescent

indicator tube.
[Drawing 30] It is drawing showing the conventional projection TV.
[Drawing 31] It is drawing showing the conventional screen.
[Drawing 32] It is drawing showing the conventional screen division.
[Drawing 33] It is drawing showing the image display device using the conventional CRT.
[Description of Notations]
1 Screen, 10 Cabinet, 11 Installation Section, 12 Rolling-Up Shaft, 13 A bar, 20 21 A liquid crystal module, 22 Projection lens, 30 An optical module, 31 A lens, 32 Polarization beam splitter, 33 A reflective mirror, 34 The liquid crystal panel for colors, 35 The liquid crystal panel for brightness, 52 A cable bundle, 53 fiber optic cables, 54 Fiber, 200 The signal-processing section, 220 The processor section, 230 CPU, 240 Memory, 250 The decode section, 260 An amendment circuit, 300 A control section, 310 The coding section, 320 Memory, 330 CPU.

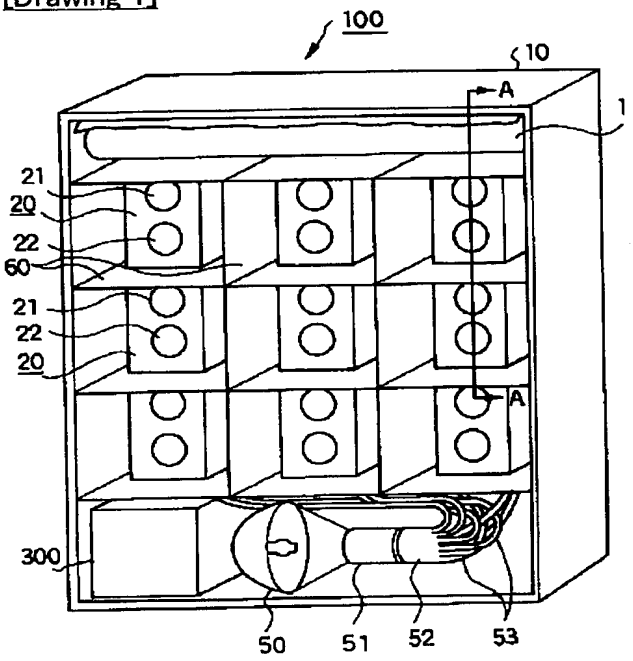
[Translation done.]

* NOTICES *

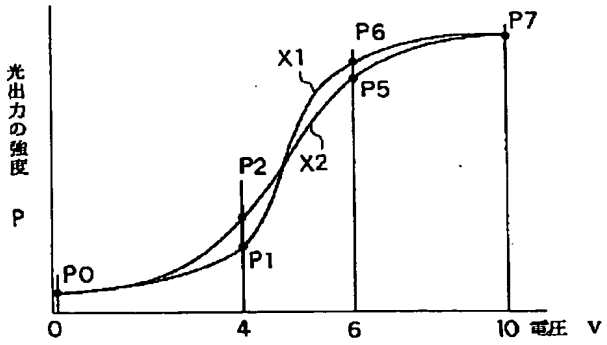
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

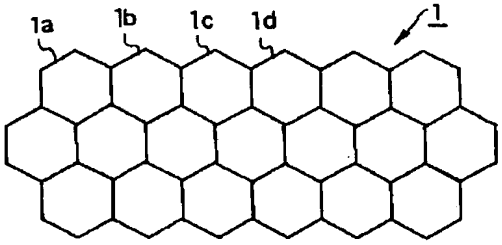
[Drawing 1]



[Drawing 5]



[Drawing 25]



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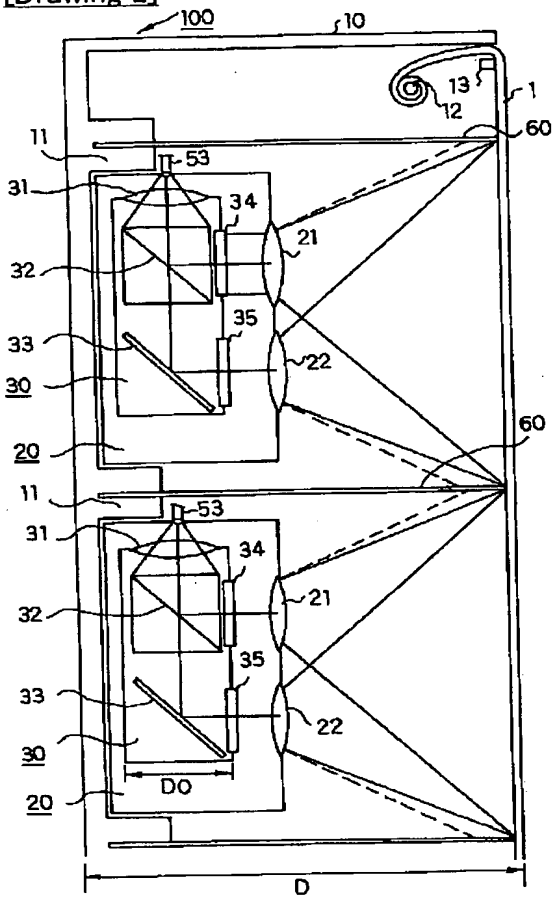

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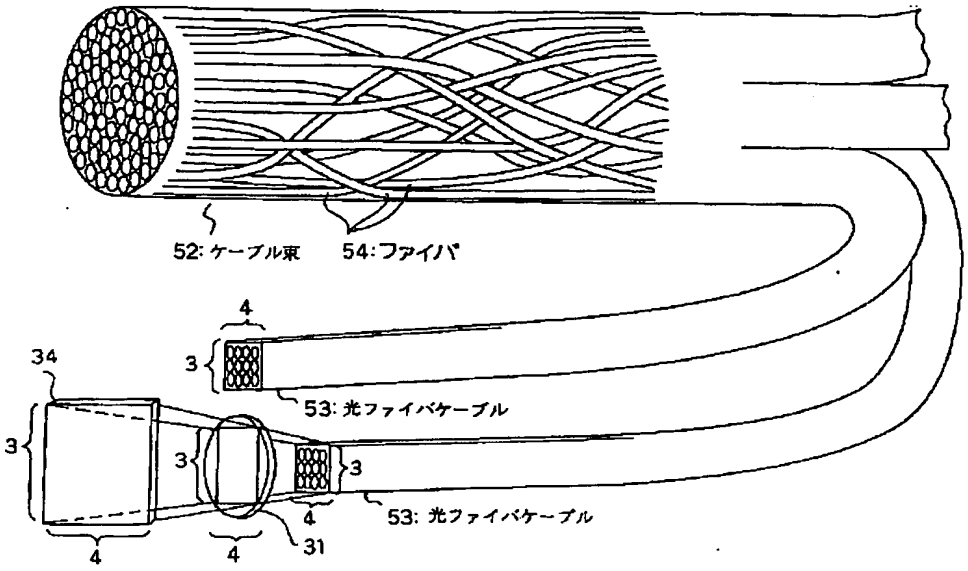

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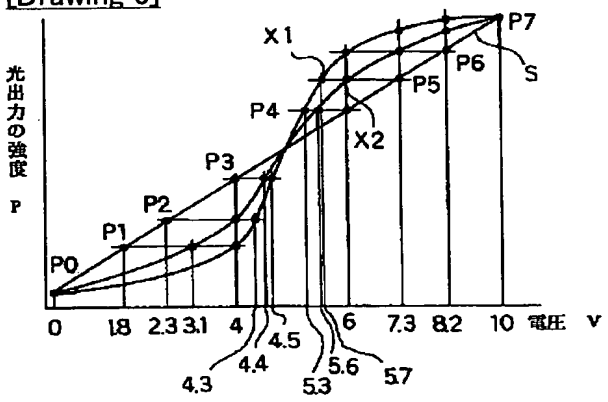
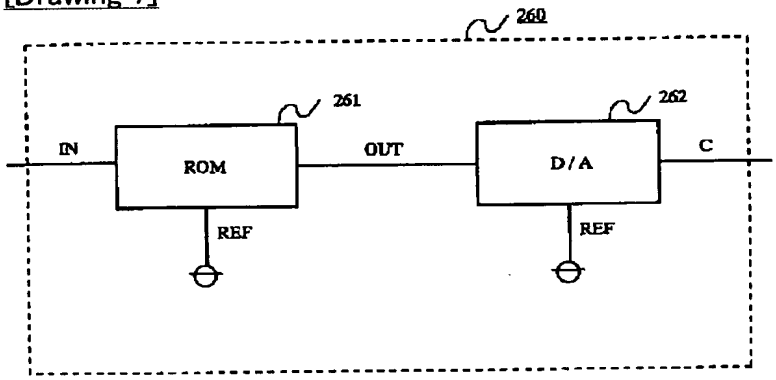
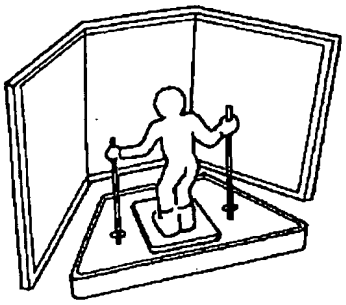


[Drawing 7]



[Drawing 22]



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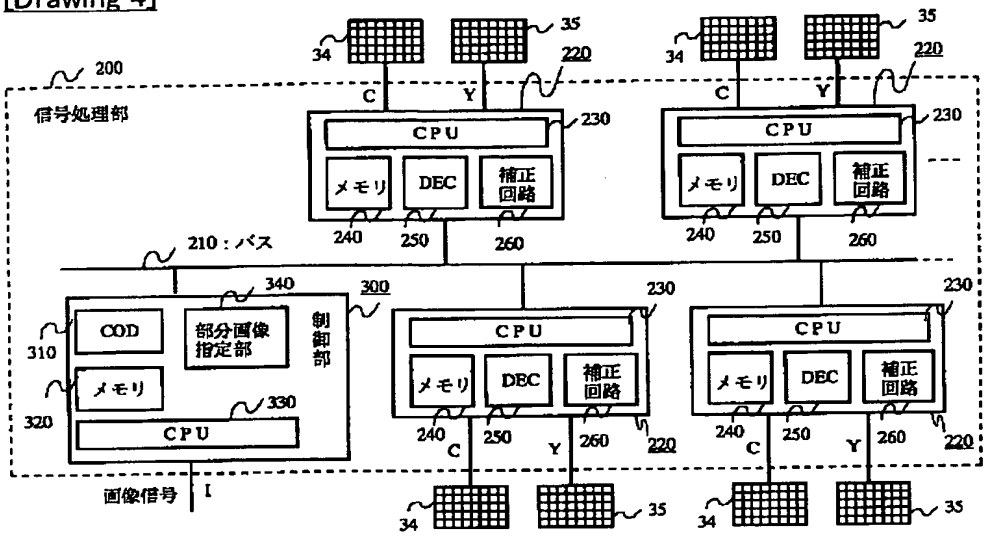
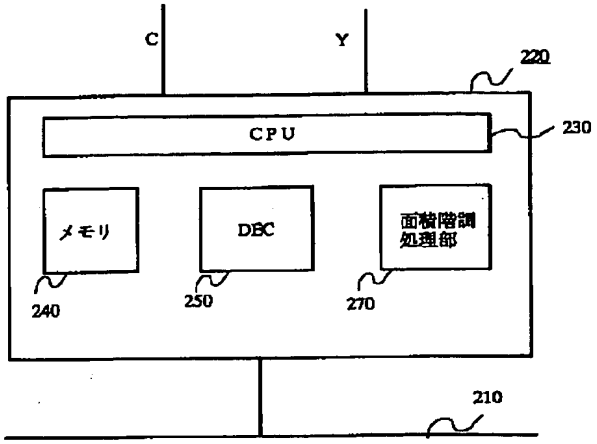


[Drawing 8]

特性X1用補正テーブル	
IN (V)	OUT (V)
0	0
:	:
1.8	4.0
:	:
2.3	4.3
:	:
4.0	4.5
:	:
6.0	5.3
:	:
7.3	5.7
:	:
8.2	6.0
:	:
10.0	10.0

[Drawing 9]



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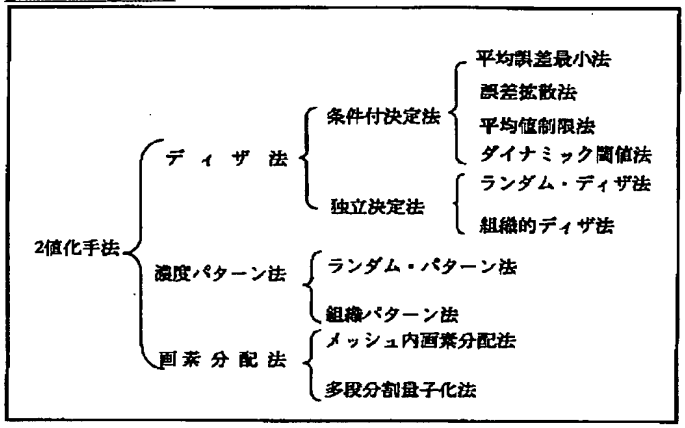

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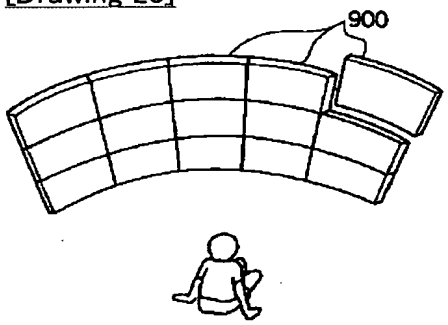

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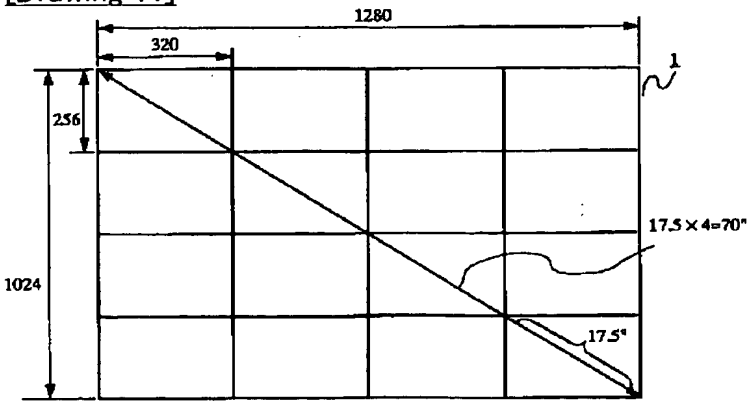

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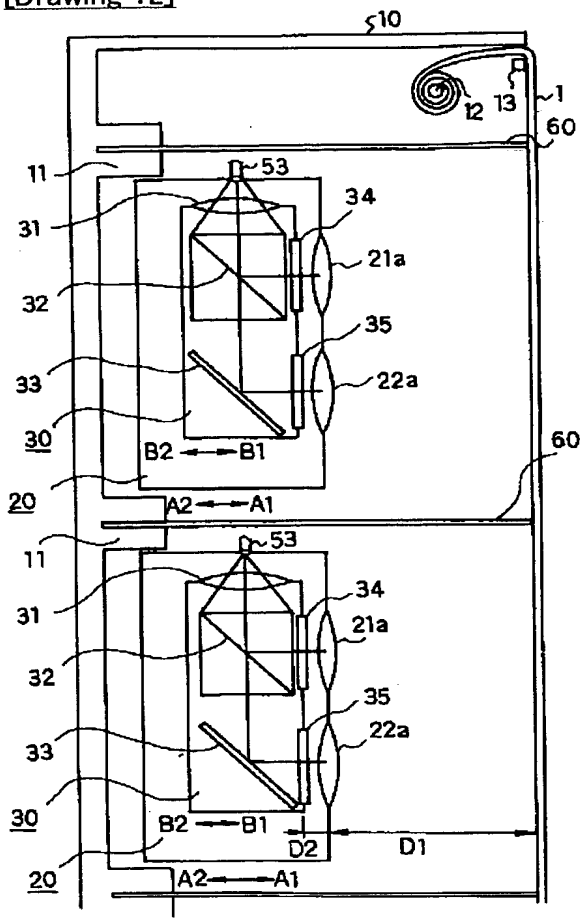

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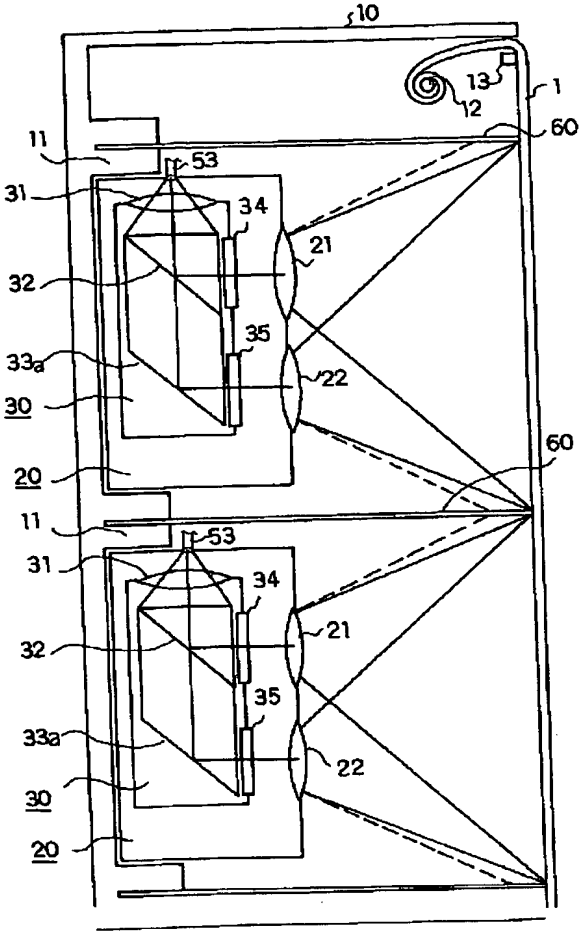
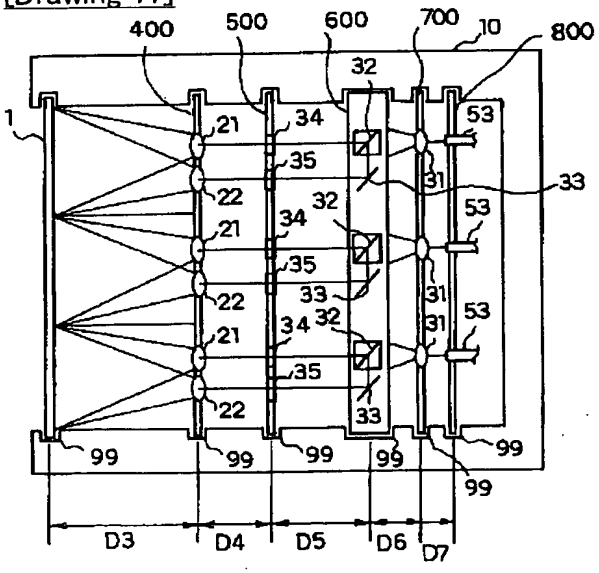


[Drawing 17]



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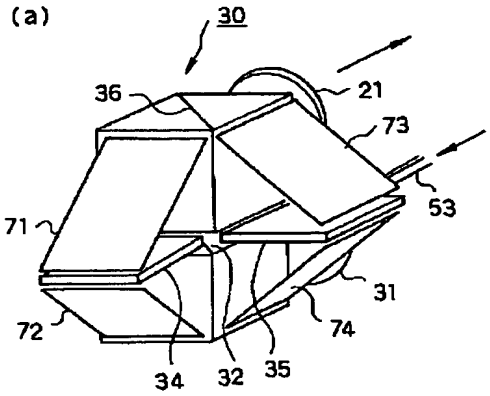
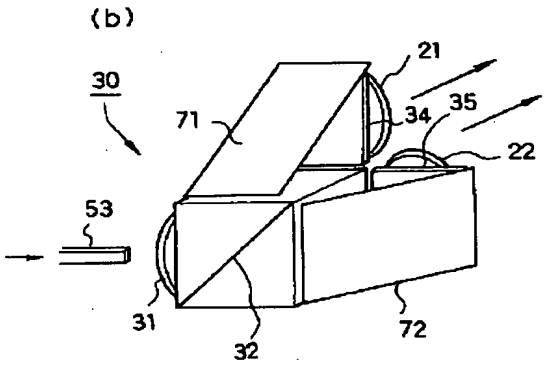
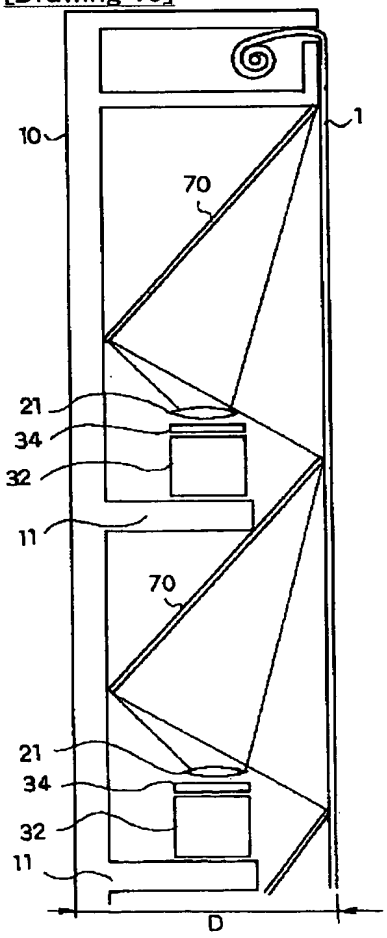
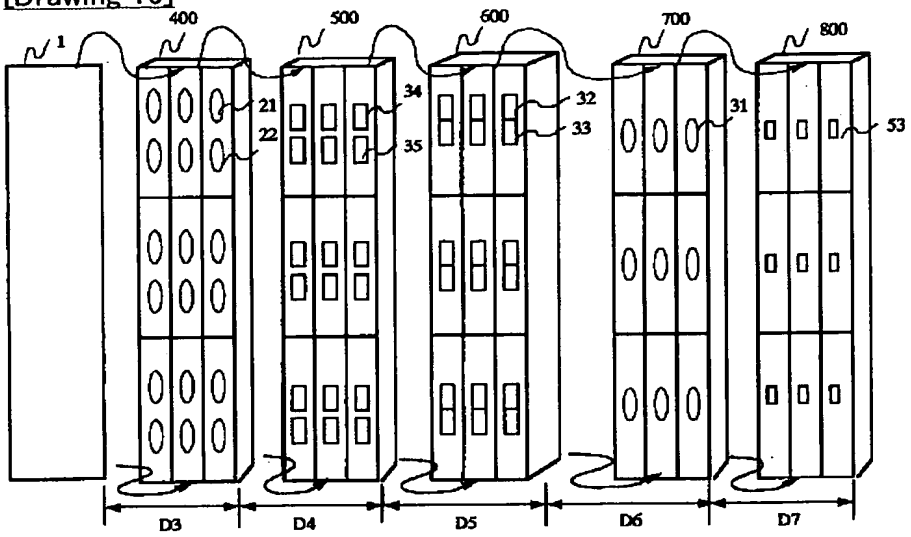

(a)
30
36
21
73
53
71
31
72
74
34
32
35


(b)
21
30
71
34
35
22
53
31
32
72

[Drawing 15]


10
1
70
21
34
32
11
70
21
34
32
11
D

[Drawing 16]



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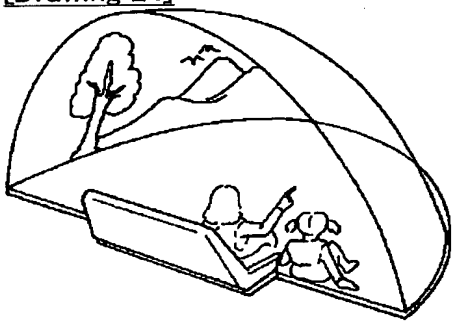

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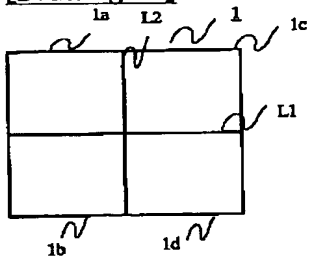

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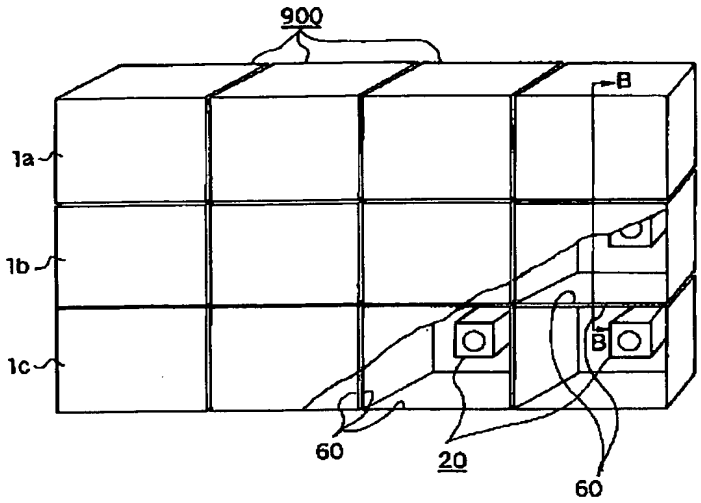

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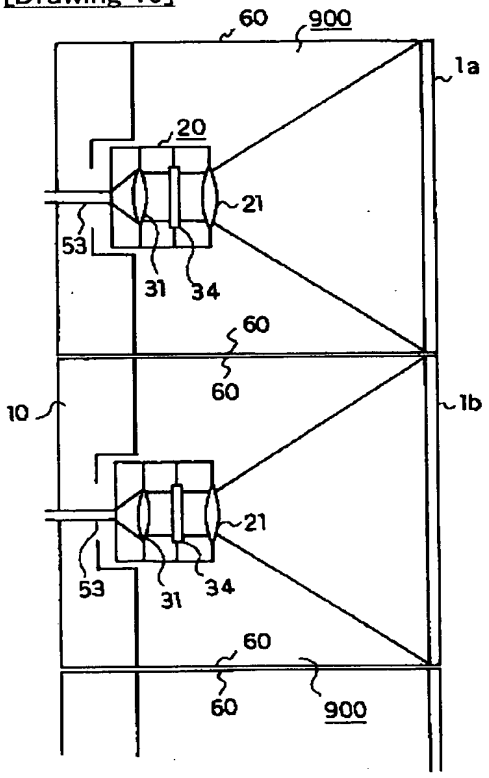

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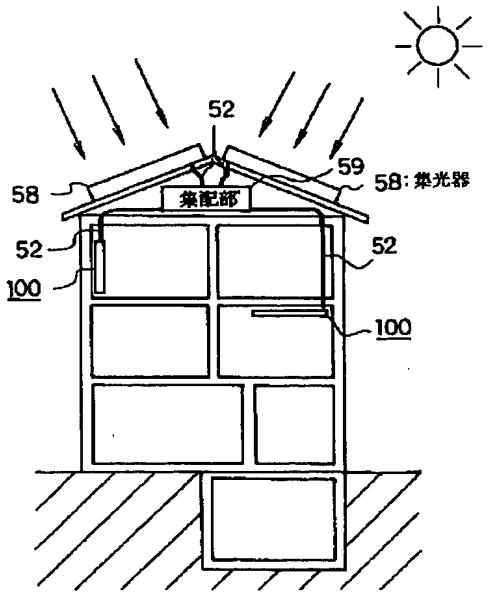
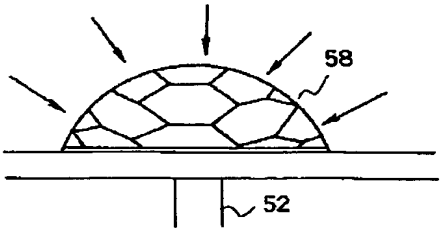
(a)



(b)



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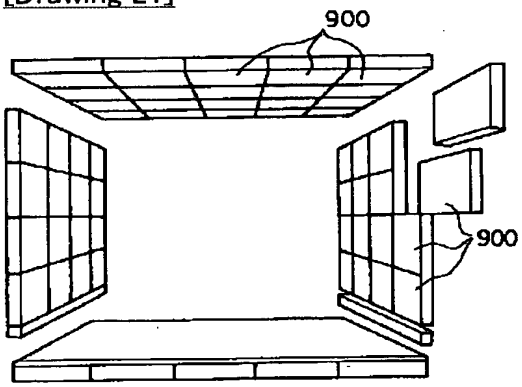

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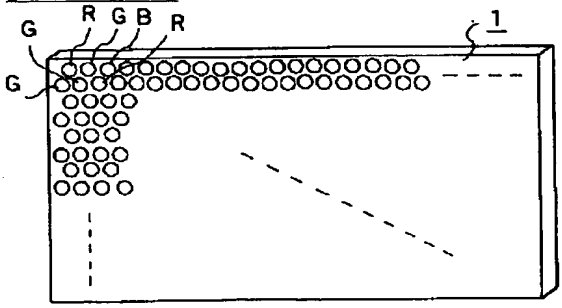

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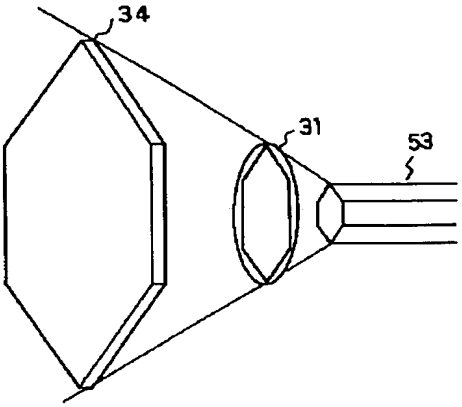

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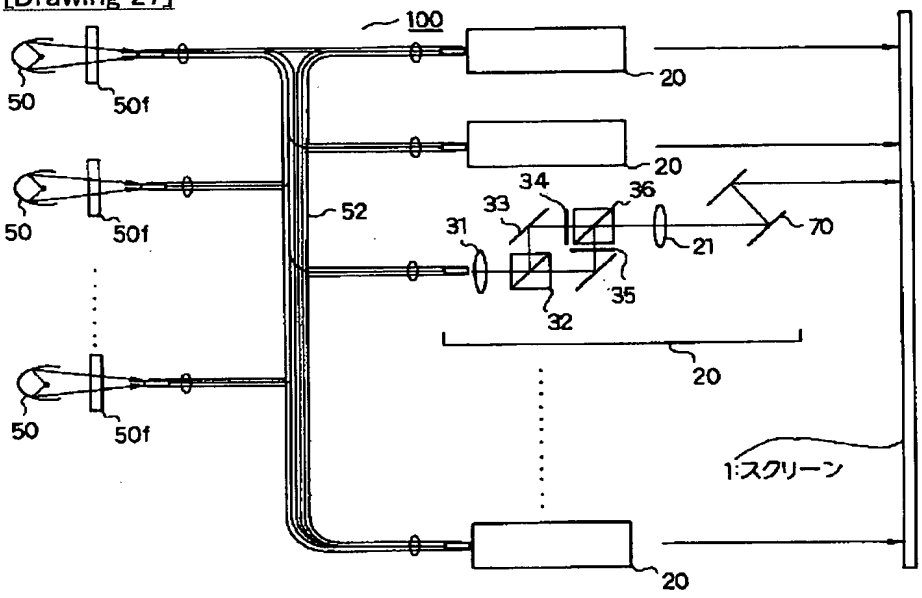
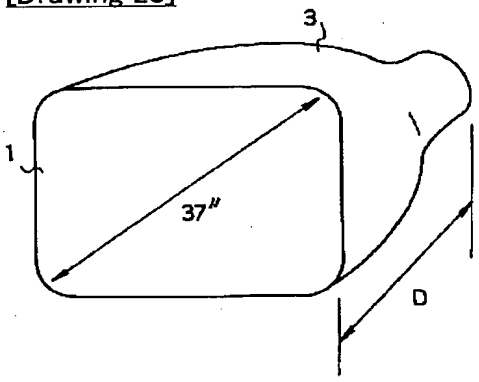


[Drawing 28]



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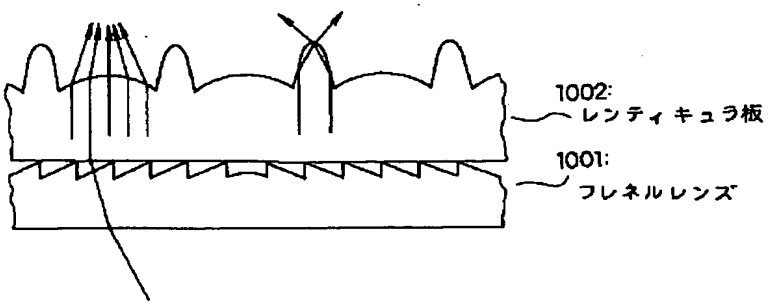

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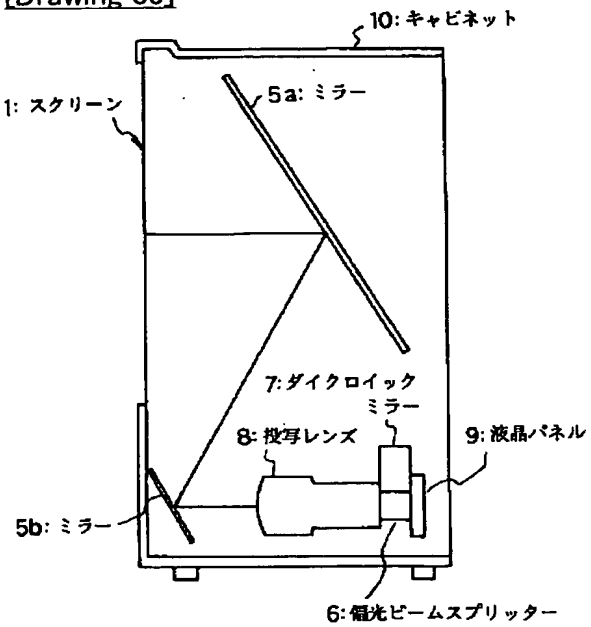

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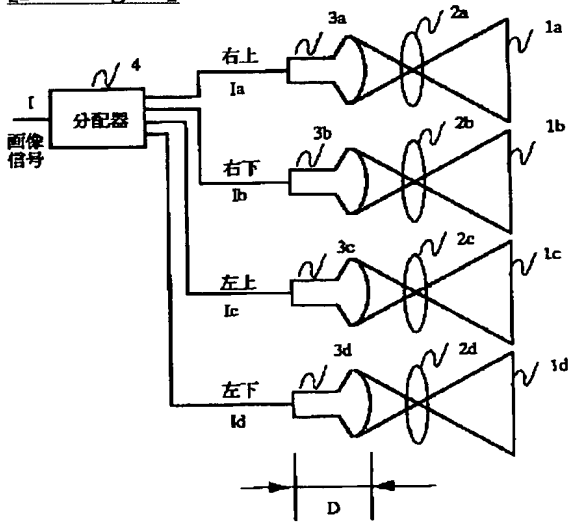

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平9－159985

(43)公開日　平成９年(1997)６月20日

(51)Int.Cl.[6]		識別記号	庁内整理番号	ＦＩ			技術表示箇所
Ｇ０２Ｆ	1/13	５０５		Ｇ０２Ｆ	1/13	５０５	
	1/1335	５１０			1/1335	５１０	

審査請求　未請求　請求項の数29　ＯＬ　（全 18 頁）

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(22)出願日　平成７年(1995)12月８日

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(74)代理人　弁理士　宮田　金雄　（外３名）

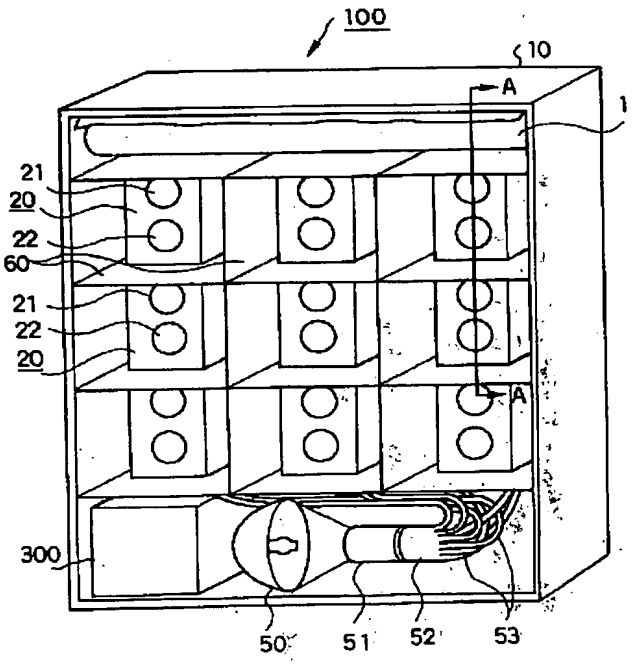
最終頁に続く

(54)【発明の名称】　画像表示システム

(57)【要約】

【課題】　薄型で軽量な大型画像表示システムを得る。

【解決手段】　液晶モジュール２０を縦横に複数配列し、光源５０から光ファイバ５３を用いて各液晶モジュール２０に対して光を供給する。スクリーン１は、キャビネット１０に巻き取られる。遮光板６０により各液晶モジュールからの画像が互いに干渉しあわないようにする。



1

【特許請求の範囲】

【請求項１】　以下の要素を有する画像表示システム（ａ）液晶パネルを備え、画像の一部を構成する部分画像を生成する複数の液晶モジュール、（ｂ）上記複数の液晶モジュールから生成された部分画像を表示するスクリーン、（ｃ）上記複数の液晶モジュールの液晶パネルに対して光を供給する光供給部。

【請求項２】　上記液晶モジュールは、カラー用液晶パネルと、輝度用液晶パネルと、カラー用液晶パネルと輝度用液晶パネルから出力された光を合成する投写レンズとを備えたことを特徴とする請求項１記載の画像表示システム。

【請求項３】　上記液晶モジュールは、更に、光供給部から供給された光を上記カラー用液晶パネルと輝度用液晶パネルに分配する偏光ビームスプリッターを備えたことを特徴とする請求項２記載の画像表示システム。

【請求項４】　上記液晶モジュールは、更に、偏光ビームスプリッターと一体化された反射板を備えたことを特徴とする請求項３記載の画像表示システム。

【請求項５】　上記液晶モジュールは、上記光供給部の上記液晶モジュールへの光供給端と、上記偏光ビームスプリッターと、上記反射板とを直列に配置するとともに、スクリーンと平行に配置したことを特徴とする請求項４記載の画像表示システム。

【請求項６】　上記液晶モジュールは、液晶パネルにより生成された画像を投写する投写レンズを備え、スクリーンと投写レンズの間に反射ミラーを備えたことを特徴とする請求項２記載の画像表示システム。

【請求項７】　上記スクリーンは、拡散素材を含んだ１枚のパネルであることを特徴とする請求項１記載の画像表示システム。

【請求項８】　上記パネルは、着脱自在に設置されていることを特徴とする請求項７記載の画像表示システム。

【請求項９】　上記パネルは、巻き取り可能に設置されていることを特徴とする請求項８記載の画像表示システム。

【請求項１０】　上記スクリーンは、中央部が奥まった凹型スクリーンであることを特徴とする請求項１記載の画像表示システム。

【請求項１１】　上記スクリーンは、ドーム型スクリーンであることを特徴とする請求項１０記載の画像表示システム。

【請求項１２】　上記スクリーンは、複数の液晶モジュールに対応して設けられた複数の部分スクリーンから構成されていることを特徴とする請求項１記載の画像表示システム。

【請求項１３】　上記部分スクリーンは、六角形であることを特徴とする請求項１２記載の画像表示システム。

【請求項１４】　上記光供給部は、複数の液晶モジュールに対して光を放出する少なくとも１つの光源と、上記

2

少なくとも１つの光源から放出された光を上記複数の液晶モジュールに分配する分配部を備えたことを特徴とする請求項１記載の画像表示システム。

【請求項１５】　上記分配部は、上記少なくとも１つの光源からの光を各液晶モジュールへ分配する複数の光ファイバケーブルを備えたことを特徴とする請求項１４記載の画像表示システム。

【請求項１６】　上記光ファイバケーブルは、プラスチックファイバを備えたことを特徴とする請求項１５記載の画像表示システム。

【請求項１７】　上記光ファイバケーブルは、複数のファイバから構成されていることを特徴とする請求項１５記載の画像表示システム。

【請求項１８】　上記複数のファイバは、ランダムに編まれていることを特徴とする請求項１７記載の画像表示システム。

【請求項１９】　上記光ファイバケーブルは、複数のファイバにより液晶モジュール側の端面で多角形を構成することを特徴とする請求項１７又は１８記載の画像表示システム。

【請求項２０】　上記ファイバの液晶モジュール側の端面の多角形は、液晶パネルのパネル形状と相似であることを特徴とする請求項１９記載の画像表示システム。

【請求項２１】　上記光供給部は、更に、周囲の光を集光して出力する集光器を備えたことを特徴とする請求項１４記載の画像表示システム。

【請求項２２】　上記画像表示システムは、更に、各液晶モジュールに対して部分画像を生成する部分画像信号を生成する信号処理部を備え、上記信号処理部は、

画像信号を伝送するバスと、

各液晶モジュールに対応して設けられた、上記バスから画像信号を入力して各液晶モジュールに対応した部分画像信号を選択して出力する複数のプロセッサ部とを備えたことを特徴とする請求項１記載の画像表示システム。

【請求項２３】　上記プロセッサ部は、更に、各液晶モジュールの表示特性に基づいて、上記部分画像信号を補正する補正回路を備えたことを特徴とする請求項２２記載の画像表示システム。

【請求項２４】　上記補正回路は、液晶モジュールへの電圧と液晶モジュールからの光出力とが比例する基準特性と一致するように、各液晶モジュールの表示特性を補正することを特徴とする請求項２３記載の画像表示システム。

【請求項２５】　上記プロセッサ部は、部分画像信号を面積階調の手法を用いた信号に変換し、上記液晶パネルは、面積階調の手法を用いて部分画像を生成することを特徴とする請求項２２記載の画像表示システム。

【請求項２６】　上記信号処理部は、更に、上記バスに接続され、上記複数のプロセッサ部に対して選択すべき部分画像信号を指示する制御部を備え、上記プロセッサ

部は、上記制御部により指示された部分画像信号を選択することを特徴とする請求項２２記載の画像表示システム。

【請求項２７】　上記画像表示システムは、更に、上記複数の液晶モジュールを着脱可能に配列して設置するキャビネットを備えたことを特徴とする請求項１記載の画像表示システム。

【請求項２８】　上記キャビネットは、上記液晶モジュールとスクリーンとの距離を変更可能に上記液晶モジュールを取り付けるとともに、上記液晶モジュールは、スクリーンと液晶パネルの間に、交換可能に取り付けられた投写レンズを備え、上記液晶モジュールは、投写レンズと液晶パネルとの距離を変更可能に取り付けることを特徴とする請求項２７記載の画像表示システム。

【請求項２９】　上記画像表示システムは、更に、隣接してスクリーンに表示される部分画像表示の境界に液晶モジュールから出力される光を遮断する遮断板を備えたことを特徴とする請求項１記載の画像表示システム。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、液晶パネルを複数用いた画像表示システムに関するものである。特に、１つの画像を分割して表示するモジュラー型の画像表示システムに関するものである。

【０００２】

【従来の技術】従来、大型の画像を表示する装置として、図２８に示すような大画面ＣＲＴ（カソード・レイ・チューブ）装置があった。図２８において、スクリーン１は、３７インチのサイズを有している。この表示装置は、ＣＲＴ３を用いているため、大きな奥行きＤを有している。このように、ＣＲＴ３を用いているため、奥行きＤを充分小さくすることはできず、ＣＲＴを用いて薄型の表示装置を提供することは難しい。

【０００３】図２９は、従来の蛍光表示管を用いた大型ディスプレイパネルである。蛍光表示管は、それぞれＲ，Ｇ，Ｂの３色の色を表示するものであり、野球場や競馬場等の大衆が集まる会場に設置される。

【０００４】図３０は、「カラー液晶ディスプレイ」（ディスプレイ技術シリーズ、小林駿介、産業図書、Ｐ２０３）に示された反射式背面投写型のプロジェクションテレビの構成を示す図である。図３１は、図３０に示したようなプロジェクションテレビのスクリーン１の断面構造図である。図３１の断面構造図は、同じく前掲の「カラー液晶ディスプレイ」のＰ２０５に示されたものである。図３０に示すようなプロジェクションテレビは、４０インチ以上の大型の画像を生成することが可能であるが、図３１に示すように、スクリーンにレンティキュラ板１００２とフレネルレンズ１００１を用いなければならず、非常に高価な装置となってしまう。フレネルレンズ１００１とレンティキュラ板１００２は、プロジェクションテレビの視覚者に対しての中心ゲインを高くするために用いるものであり、スクリーン１が図３１に示すような構造を取ることにより、水平方向の視覚特性を向上させている。また、図示していないが、光源から放射される光の紫外線をカットするためのフィルタを備えている。

【０００５】図３２は、１つのスクリーンを４つのスクリーンを分割して画像を表示する表示装置を示している。図３３は、その内部構造を示している。分割された部分スクリーン１ａ～１ｄに、それぞれ対応して投写レンズ２ａ～２ｄ及びＣＲＴ３ａ～３ｄが設けられている。分配器４は、画像信号Ｉを入力し、画像信号を１／４に分割し、それぞれ分割された画像信号Ｉａ～Ｉｄを ＣＲＴ３ａ～３ｄへ出力する。部分スクリーン１ａ～１ｄ間には、境界Ｌ１とＬ２が存在し、この境界Ｌ１とＬ２の除去が課題となっている。

【０００６】

【発明が解決しようとする課題】図２８に示した大型のＣＲＴを用いた表示装置は、奥行きＤを小さくすることができず、装置が薄型にできないという欠点があった。また、１つのＣＲＴを用いて画像を生成しているため、最大３７インチ程度の画像しかできず、それ以上大きな画像を生成することができなかった。

【０００７】また、図２９に示す蛍光表示管を用いた表示システムは、蛍光表示管が故障する度に、故障が発生した蛍光表示管を取り替えなければならないという欠点があった。特に、野球場や競馬場等の高所に取り付けられているため、故障のあった蛍光表示管を交換するという作業は危険を伴い、かつ、時間を費やす作業であった。

【０００８】また、図３０及び図３１に示した従来のプロジェクションテレビは、キャビネットの内部で光路を反射させることにより薄型化を図っているが、家庭内の一室で用いる程、充分薄型化を図ることはできなかった。また、中心ゲインを上げるために、スクリーンがフレネルレンズとレンティキュラ板を用いた特殊な構造をしており、装置の価格が高価なものとならざるを得なかった。また、フレネルレンズとレンティキュラ板が互いに干渉し、縦縞のモアレを生じるという欠点があった。

【０００９】また、図３２及び図３３に示した複数の小型ＣＲＴを用いた表示装置は、分割された部分スクリーン１ａ～１ｄに境界Ｌ１，Ｌ２ができてしまうという欠点があった。また、小型ＣＲＴ３ａ～３ｄを用いているが、小型ＣＲＴの奥行きＤを充分小さくすることができず、装置の薄型化を図ることができなかった。

【００１０】また、従来の表示装置は、ＣＲＴを用いたり、蛍光表示管を用いているので、装置自身の重量が大きくなるという欠点があった。従って、一度設置すると、その表示システムを手軽に持ち運びしたり、移動したりするということができにくかった。

【００１１】この発明は、以上のような問題点を解決するためになされたものであり、大型の画像を生成することができる画像表示システムを得ることを目的とする。

【００１２】また、この発明は、薄型で家庭内の部屋のスペースでも充分利用可能な画像表示システムを得ることを目的とする。

【００１３】また、この発明は、装置の重量を軽くした移動可能な画像表示システムを得ることを目的とする。

【００１４】また、この発明は、低価格の画像表示システムを得ることを目的とする。

【００１５】また、この発明は、スクリーンのサイズが変更可能であるとともに、スクリーンの全体形状が変更可能なスケーラブルな画像表示システムを得ることを目的とする。

【００１６】また、この発明は、故障した場合にメンテナンスが容易な画像表示システムを得ることを目的とする。

【００１７】

【課題を解決するための手段】この発明に係る画像表示システムは、以下の要素を有する。

（ａ）液晶パネルを備え、画像の一部を構成する部分画像を生成する複数の液晶モジュール、（ｂ）上記複数の液晶モジュールから生成された部分画像を表示するスクリーン、（ｃ）上記複数の液晶モジュールの液晶パネルに対して光を供給する光供給部。

【００１８】上記液晶モジュールは、カラー用液晶パネルと、輝度用液晶パネルと、カラー用液晶パネルと輝度用液晶パネルから出力された光を合成する投写レンズとを備えたことを特徴とする。

【００１９】上記液晶モジュールは、更に、光供給部から供給された光を上記カラー用液晶パネルと輝度用液晶パネルに分配する偏光ビームスプリッターを備えたことを特徴とする。

【００２０】上記液晶モジュールは、更に、偏光ビームスプリッターと一体化された反射板を備えたことを特徴とする。

【００２１】上記液晶モジュールは、上記光供給部の上記液晶モジュールへの光供給端と、上記偏光ビームスプリッターと、上記反射板とを直列に配置するとともに、スクリーンと平行に配置したことを特徴とする。

【００２２】上記液晶モジュールは、液晶パネルにより生成された画像を投写する投写レンズを備え、スクリーンと投写レンズの間に反射ミラーを備えたことを特徴とする。

【００２３】上記スクリーンは、拡散素材を含んだ１枚のパネルであることを特徴とする。

【００２４】上記パネルは、着脱自在に設置されていることを特徴とする。

【００２５】上記パネルは、巻き取り可能に設置されていることを特徴とする。

【００２６】上記スクリーンは、中央部が奥まった凹型スクリーンであることを特徴とする。

【００２７】上記スクリーンは、ドーム型スクリーンであることを特徴とする。

【００２８】上記スクリーンは、複数の液晶モジュールに対応して設けられた複数の部分スクリーンから構成されていることを特徴とする。

【００２９】上記部分スクリーンは、六角形であることを特徴とする。

【００３０】上記光供給部は、複数の液晶モジュールに対して光を放出する少なくとも１つの光源と、上記少なくとも１つの光源から放出された光を上記複数の液晶モジュールに分配する分配部を備えたことを特徴とする。

【００３１】上記分配部は、上記少なくとも１つの光源からの光を各液晶モジュールへ分配する複数の光ファイバケーブルを備えたことを特徴とする。

【００３２】上記光ファイバケーブルは、プラスチックファイバを備えたことを特徴とする。

【００３３】上記光ファイバケーブルは、複数のファイバから構成されていることを特徴とする。

【００３４】上記複数のファイバは、ランダムに編まれていることを特徴とする。

【００３５】上記光ファイバケーブルは、複数のファイバにより液晶モジュール側の端面で多角形を構成することを特徴とする。

【００３６】上記ファイバの液晶モジュール側の端面の多角形は、液晶パネルのパネル形状と相似であることを特徴とする。

【００３７】上記光供給部は、更に、周囲の光を集光して出力する集光器を備えたことを特徴とする。

【００３８】上記画像表示システムは、更に、各液晶モジュールに対して部分画像を生成する部分画像信号を生成する信号処理部を備え、上記信号処理部は、画像信号を伝送するバスと、各液晶モジュールに対応して設けられた、上記バスから画像信号を入力して各液晶モジュールに対応した部分画像信号を選択して出力する複数のプロセッサ部とを備えたことを特徴とする。

【００３９】上記プロセッサ部は、更に、各液晶モジュールの表示特性に基づいて、上記部分画像信号を補正する補正回路を備えたことを特徴とする。

【００４０】上記補正回路は、液晶モジュールへの電圧と液晶モジュールからの光出力とが比例する基準特性と一致するように、各液晶モジュールの表示特性を補正することを特徴とする。

【００４１】上記プロセッサ部は、部分画像信号を面積階調の手法を用いた信号に変換し、上記液晶パネルは、面積階調の手法を用いて部分画像を生成することを特徴とする。

【００４２】上記信号処理部は、更に、上記バスに接続され、上記複数のプロセッサ部に対して選択すべき部分

画像信号を指示する制御部を備え、上記プロセッサ部は、上記制御部により指示された部分画像信号を選択することを特徴とする。

【００４３】上記画像表示システムは、更に、上記複数の液晶モジュールを着脱可能に配列して設置するキャビネットを備えたことを特徴とする。

【００４４】上記キャビネットは、上記液晶モジュールとスクリーンとの距離を変更可能に上記液晶モジュールを取り付けるとともに、上記液晶モジュールは、スクリーンと液晶パネルの間に、交換可能に取り付けられた投写レンズを備え、上記液晶モジュールは、投写レンズと液晶パネルとの距離を変更可能に取り付けることを特徴とする。

【００４５】上記画像表示システムは、更に、隣接してスクリーンに表示される部分画像表示の境界に液晶モジュールから出力される光を遮断する遮断板を備えたことを特徴とする。

【００４６】

【発明の実施の形態】図１は、この発明の画像表示システムの一例を示す図である。図１においては、内部構造を表示するためにスクリーン１は、キャビネット１０の上部に巻き取られている状態を示している。或いは、スクリーン１を取り外し可能に設置しても良い。実際に画像が表示される場合は、スクリーン１は、画像表示システム１００全体を覆う。図１に示す例においては、３×３の配列で液晶モジュール２０がキャビネット１０に配置されている。各液晶モジュール２０には、投写レンズ２１と２２が設けられている。投写レンズ２１と２２から投写された画像は合成され、スクリーン１の背後から投写される。キャビネット１０の内部には、制御部３００が設けられており、画像表示システム１００全体を制御する。また、キャビネット１０の内部には、光源５０が１つだけ設けられている。光源から放射された光は、インテグレータ５１を通過し、ケーブル束５２を経て光ファイバケーブル５３により分割される。インテグレータ５１は、光源５０からの光を均一にする。光ファイバケーブル５３は、各液晶モジュール２０に対して分割された光を供給する。各液晶モジュール２０の合間に設けられた遮光板６０は、各液晶モジュールからの光が他の液晶モジュールからの光と互いに干渉しあわないための薄板である。

【００４７】図２は、図１に示した画像表示システムのＡ－Ａ断面図である。キャビネット１０には、スクリーン１を巻き取るための巻き取り軸１２が存在する。巻き取り軸１２は、図示していないモータにより、或いは、手動によりスクリーン１を巻き取るための軸である。バー１３は、スクリーン１を画像表示システム１００の前面に位置合わせするための機能を有している。キャビネット１０には、複数の取り付け部１１が存在しており、取り付け部１１により液晶モジュール２０をキャビネットに取り付けることができる。取り付け部１１と液晶モジュール２０の取り付けは、ネジやマグネットを用いた公知の着脱機構により行われる。また、取り付け部１１には、遮光板６０が着脱可能にさし込まれている。この遮光板６０は、各液晶モジュールからの光が他の液晶モジュールとの光と干渉しないようにするためのものである。例えば、図２において、点線で示す光は、遮光板６０により遮断されるため、他の液晶モジュールからの光と干渉することがなく、鮮明な画像を生成するのに役立つ。遮光板６０の厚さは薄ければ薄い程良い。例えば、０．１～０．２mm程度の厚さを持つ黒い鉄板を用いることが望ましい。遮光板６０の厚さが厚くなると、スクリーンに対して遮光板の影を生成してしまうことになる。０．１mm～０．２mmの厚さの場合には、スクリーンに対して遮光板の影を生成することなく、画像に対して何等悪影響を及ぼさない範囲となる。

【００４８】液晶モジュール２０には、投写レンズ２１と２２が配置されている。投写レンズ２１と２２からの光は、スクリーン上にオーバラップして投写される。また、液晶モジュール２０には、光ファイバケーブル５３が接続される。液晶モジュール２０には、内部に更にモジュール化された光モジュール３０が存在する。光モジュール３０には、レンズ３１と偏光ビームスプリッター３２と反射ミラー３３が直列に配列されている。偏光ビームスプリッター３２の側面には、カラー用液晶パネル３４が配置される。反射ミラー３３の側面には、輝度用液晶パネル３５が配置される。カラー用液晶パネル３４の配置位置は、輝度用液晶パネル３５よりも光ファイバケーブル５３から照射される光に近い方が望ましい。カラー用液晶パネルの光出力をできるだけ強くするためである。例えば、カラー用液晶パネルと輝度用液晶パネルの配置を逆にした場合、反射ミラー３３の反射が全反射でなく、光出力が弱められてしまうので、カラー用液晶パネル３４は、偏光ビームスプリッター３２の側面に配置するのが望ましい。

【００４９】図２に示すように、光ファイバケーブル５３とレンズ３１と偏光ビームスプリッター３２と反射ミラー３３を直列に配置するとともに、この直列に配置された複数の部品をスクリーンと平行に配置することにより、装置の奥行きＤを小さくすることができる。カラー用液晶パネル３４及び輝度用液晶パネル３５のサイズを、例えば、０．７インチ程度のものとすると、光モジュール３０の奥行きＤ０は、たかだた１インチ程度で良い。画像を生成する部分が１インチ程度に収まるため、従来のＣＲＴを用いた表示装置に比べて非常に薄型の装置を提供することができる。例えば、０．７インチの液晶パネル３４，３５を用いた場合には、画像表示システム１００全体の奥行きＤを２０ｃｍ程度にすることが可能である。

【００５０】図３は、図１及び図２に示した光ファイバ

ケーブルの詳細を示す図である。ケーブル束５２は、ファイバ５４により構成されている。図１に示すように、９個の液晶モジュールに対して光を分割して供給する場合には、９本の光ファイバケーブル５３が必要である。例えば、１２本のファイバを１つのケーブルにまとめることにより、光ファイバケーブル５３を構成する。従って、ファイバ５４の全本数は、９×１２＝１０８本となる。即ち、ケーブル束５２は、１０８本のファイバ５４より構成されている。ケーブル束５２の光源側の端面形状は、円形である。光源５０は、回転放物面鏡、或いは、回転楕円鏡等の反射鏡を備えているため、光源５０から放射される光の断面は円形をしている。この光を効率よく吸収するために、インテグレータ５１の断面及びケーブル束５２の断面は、円形をしていることが望ましい。なお、上記説明においては、構成を簡略化してファイバの全本数を１０８本としているが、実際には、ファイバの本数は、光強度分布を均一化するために、例えば、７０００～１万本程度必要である。或いは、ファイバの太さにもよるが、数万本のファイバでファイバケーブルを構成する場合もある。一方、光ファイバケーブル５３の端面は、液晶パネルと同じ形状をしていることが望ましい。例えば、カラー用液晶パネル３４が縦横比が３：４の形状をしている場合、光ファイバケーブル５３の端面も同じように、３：４の矩形をしていることが望ましい。光ファイバケーブル５３の端面が３：４の矩形をしていることにより、光ファイバケーブル５３から放射される光がそのまま液晶パネル３４に無駄なく利用される。

【００５１】通常の液晶パネルを用いた表示装置においては、光源から発生された、断面が円形の光束は、矩形の形状した液晶パネルに照射される時点で周囲部分がカットされ無駄を生じてしまうが、この例によれば、円形の光束を光ファイバケーブルの内部にあるファイバ５４の配列により組み替えて矩形に変換しているため、無駄になることがない。この例では、説明を簡単にするために、１２本のファイバ５４を用いて１本の光ファイバケーブル５３を構成しているため、ファイバ５４を３×４に配置することにより、液晶パネルと同じ３：４の縦横比を持つ光束を生成することができる。或いは、数千本から数万本のファイバを３×４の整数倍に配置してもよい。また、端面が３：４の縦横比を持つ矩形のケーブルにファイバを収容することにより、３：４の縦横比を持つ光束を生成してもよい。もし、液晶パネルの縦横比と同様の縦横比を光ファイバケーブル５３が作れない場合であっても、レンズ３１により縦横比を変えることにより、結果として液晶パネルと同様の縦横比の光束を生成することができる。例えば、光ファイバケーブル５３が９本のファイバ５４より構成されている場合には、３×３の正方形を構成し、レンズ３１により横方向に４／３倍し、３：４の矩形の光束を生成して、液晶パネル３４に照射すればよい。

【００５２】ケーブル束５２は、前述したように、複数のファイバ５４から構成されているが、ファイバ５４をケーブル束５２の内部でランダムに編むことにより、光ファイバケーブル５３から出力される光を均一にすることができる。もし、光ファイバ５４をケーブル束５２内で編まずに、ストレートに配置した場合には、光源５０から放射された光の偏った部分が、特定の光ファイバケーブル５３に出力されることになる。光源５０からの光は、その断面部分において、強弱があり、均一ではない。例えば、光束の中央部分においては、強力な光が発せられ、周辺部分においては、弱い光が発せられている。これらの部分から直接光ファイバケーブルに光を出力した場合には、光ファイバケーブル毎に偏った光がそのまま液晶パネルに照射されてしまうことになる。従って、生成される画像もムラができてしまう。しかし、この例のように、ファイバ５４ををランダムに編みあわせることにより、複数の光ファイバケーブル５３から出力される光は均一となり、結果として液晶パネルにより生成される画像もバラツキのない画像となる。

【００５３】また、ファイバ５４をランダムに編みあわせることにより、図１に示したインテグレータ５１を用いなくても良くなる。インテグレータ５１は、光源５０から放射された光を均一にするために用いるものであるが、前述したようにファイバのランダムな編みあわせにより、同様に光出力の均一化が図れるため、インテグレータ５１は不要となる。

【００５４】ファイバ５４として、石英ファイバとプラスチックファイバの使用が考えられる。プラスチックファイバを用いると、紫外線をカットすることができるので、光源５０からの光から紫外線をカットするフィルタが必要なくなる。

【００５５】図１に示したように、この画像表示システム１００の大きな特徴は、複数の液晶モジュール２０に対して、１つの光源を有している点である。１つの光源からの光を、光ファイバケーブルを用いて複数の液晶モジュールに光を供給することにより、装置全体が軽量化するとともに、装置のコストを低減することができる。また、光源のランプに故障が生じた場合、ランプを交換するだけで良く、メンテナンスが容易である。

【００５６】また、図１及び図２に示したように、液晶モジュール２０に何等かの故障が発生した場合でも、スクリーン１を巻き上げることにより、或いは、スクリーン１を取り外すことにより、画像表示システム１００の前面から液晶モジュール２０を取り出すことができ、容易にメンテナンスをすることができる。液晶モジュール２０の故障の原因が分からない場合には、液晶モジュール２０を現場において、交換してしまうことも可能である。また、前述した光源のランプの交換も画像表示システム１００の前面から行うことができる。また、遮光板

６０も抜き差し可能なので、メンテナンスが更に容易である。また、液晶パネルは、ＣＲＴに比べて軽量であり、液晶モジュール２０は、ＣＲＴに比べて軽量である。また、光源も１個のみ備えていれば良く、画像表示システム１００全体を軽量にすることができる。

【００５７】図４は、図１に示した画像表示システムの信号処理部の構成を示す図である。図１及び図２には図示していなかったが、各液晶モジュール２０には、プロセッサ部２２０がそれぞれ配置されている。各プロセッサ部２２０は、バス２１０により接続されている。バス２１０は、更に、制御部３００に接続されている。制御部３００は、外部から画像信号Ｉを入力し、入力した画像信号をバス２１０に出力するとともに、プロセッサ部を制御するコントロール信号をバス２１０に出力する。各プロセッサ部２２０は、制御部から出力された画像信号を入力するとともに、制御部から出力されたコントロール信号に基づき部分画像信号を抽出し、抽出した部分画像信号から駆動信号ＣとＹを生成し、カラー用液晶パネル３４及び輝度用液晶パネル３５に出力する。

【００５８】制御部３００には、符号化部（ＣＯＤ）３１０、メモリ３２０、ＣＰＵ３３０及び部分画像指定部３４０が存在する。部分画像指定部３４０は、画像表示システムの構成を把握し、画像表示システムの構成に基づいて各プロセッサ部２２０に対して、抽出すべき部分画像を指定する。例えば、ある画像表示システムの画像が４つの部分画像から構成される場合には、各プロセッサ部に対して１／４の画像を抽出するように指定する。或いは、画像が９つの部分画像から構成される場合には、各プロセッサ部に対して１／９の画像を抽出するように指定する。また、各プロセッサ部に対して画像のどの部分を抽出すべきかを指定する。各プロセッサ部は、部分画像指定部３４０により指定された範囲の部分画像が抽出できるように、プログラムされている。この部分画像指定部３４０が存在しているため、画像表示システムの画像分割仕様が変更された場合でも、プロセッサ部には何の変更も必要なく、仕様変更に柔軟に対応することができる。このように、プロセッサ部が部分画像指定部３４０により指定された部分画像を抽出できるようになっているおかげで、画像表示システムのサイズが変更された場合や配列数や形状が変更された場合においても、各プロセッサ部の変更を一切行う必要がなく、画像を表示することができる。

【００５９】制御部３００の符号化部３１０は、画像信号Ｉを入力し、その信号をデジタル符号としてバス２１０に出力する。バスに出力される画像信号は、１画面分の画像信号である。各プロセッサ部は、前述したように、部分画像指定部３４０により指定された部分画像のみを、それぞれ入力する。

【００６０】各プロセッサ部２２０には、ＣＰＵ２３０、メモリ２４０、復号部（ＤＥＣ）２５０、補正回路２６０が存在する。復号部２５０は、バス２１０から入力された画像信号を復号するものである。ＣＰＵ２３０は、復号部２５０の復号処理を管理するとともに、前述したように、そのプロセッサ部が表示するのに必要な部分画像のみを指定して復号させる。補正回路２６０は、複数の液晶パネルの特性を基準特性と一致させるため、駆動信号Ｃ及びＹを補正する回路である。

【００６１】図５は、液晶パネルの特性を示す図である。図５において、横軸は駆動信号Ｃ又はＹの電圧Ｖを示し、縦軸は液晶パネルから出力される光出力の強度Ｐを示している。液晶パネルには、各液晶パネル毎に固有の特性がある。図５においては、Ｘ１とＸ２の２つの特性を示している。例えば、駆動信号の電圧が４Ｖの場合、特性Ｘ１によれば光出力の強度は、Ｐ１であるのに対して、特性Ｘ２によれば光の強度は、Ｐ２であり、両者には差（Ｐ１≠Ｐ２）がある。この差が存在することにより、部分画像毎に異なる出力がされてしまう。隣り合う部分画像の色の度合いや明るさを同一に保つためには、液晶パネルの特性が均一でなければならない。補正回路２６０は、図５に示したような特性Ｘ１及び特性Ｘ２を１つの基準特性に一致させるための回路である。

【００６２】図６は、補正回路２６０の動作を説明する図である。図６において、Ｐ０からＰ７への直線は基準特性Ｓである。図７は、補正回路２６０の構成を示す図である。ＲＯＭ２６１は、補正前のデジタル駆動信号ＩＮを入力し、補正後のデジタル駆動信号ＯＵＴを出力する。デジタルアナログ変換器２６２は、補正後のデジタル駆動信号ＯＵＴをアナログの駆動信号Ｃに変換する。

【００６３】図８は、ＲＯＭ２６１の内部に記憶された補正テーブルである。ＲＯＭ２６１は、補正前デジタル駆動信号ＩＮを入力し、図８に示す補正テーブルから補正後のデジタル駆動信号ＯＵＴを検索して出力する。例えば、図６に示すように、駆動信号の電圧が４Ｖの場合、特性Ｘ１によれば光出力の強度は、Ｐ１であるが、基準特性Ｓは、Ｐ３を示している。特性Ｘ１によれば、光出力の強度Ｐ３を出力するためには、４．５Ｖの駆動信号を必要とする。従って、図８に示すように、４Ｖの入力があった場合には、４．５Ｖの出力を行うことにより、光出力の強度をＰ１からＰ３に変更することができる。特性Ｘ２に対しても、同様な補正テーブルを用いることにより、４Ｖの駆動信号に対して、光出力の強度がＰ３となるようにすることができる。図６に示すように、特性Ｘ２に対して４Ｖの入力があった場合、光出力の強度Ｐ３とするためには、４Ｖの駆動信号を４．４Ｖの駆動信号に変換すれば良い。このようにして、特性Ｘ１及びＸ２に対して４Ｖの入力があった場合、従来は、光出力の強度が図５に示すように、Ｐ１及びＰ２であり差があったのに対して、この例においては、特性Ｘ１でも特性Ｘ２でも、Ｐ３という光出力の強度を共に得ることができ、液晶パネルから生成される画像の色の度合い

や明るさを均一にすることができる。図６においては、基準特性Ｓは、駆動信号の電圧Ｖの変化により光出力の強度Ｐが比例して増加する場合を示している。このように、駆動信号の電圧Ｖと光出力の強度Ｐの間に線形関係を持たせることが前述した補正回路の役割である。即ち、各液晶パネルの持つ特性を、この基準特性に合わせるように駆動信号の電圧を変えるのが前述した補正回路の役割である。なお、図７及び図８に示したＲＯＭ２６１を用いる補正回路は一例であり、その他の回路、或いは、その他のソフトウェアを用いて同様に各液晶パネルの特性を補正することが可能である。

【００６４】図９は、前述したプロセッサ部２２０の補正回路２６０の代わりに、面積階調処理部２７０を設けた例を示している。液晶パネルの特性を補正する必要があるのは、図５に示すように、駆動信号の電圧Ｖに対して同じ光出力することができない特性部分があったからである。そこで、図５に示す駆動信号の電圧Ｖが０Ｖの場合及び１０Ｖの場合のように、各特性の光出力が必ず等しくなる電圧のみを用いて画像を表示してやれば、駆動信号の電圧Ｖを補正する必要がなくなる。即ち、液晶パネルをＯＮかＯＦＦのどちらかの状態で用いることにより、液晶パネルの間で特性が異なっていても何等問題なく使用することができる。面積階調処理部２７０は、図５に示す駆動信号の電圧Ｖが０Ｖの場合と、１０Ｖの場合のみを用いて画像を表示するものである。即ち、ＯＮかＯＦＦかの２値を用いて画像表示するものである。

【００６５】図１０は、「イメージング」（電子写真学会編、昭和６３年１月２０日発行、Ｐ３１）に示された階調再現のための各種２値化手法を示す図である。面積階調処理部２７０は、例えば、図１０に示すような２値化手法のいずれかの手法を用いて、中間色（階調）を２値で表す。

【００６６】図１１は、４×４の配列を持った画像表示システムの一例を示す図である。１画面が１０２４×１２８０ドットで構成されている場合、部分画像は、２５６×３２０ドットで構成される。また、部分画像のサイズは、１７．５インチであり、全体画像のサイズは、１７．５×４＝７０インチである。０．７インチの液晶パネルを用いて、２５６×３２０＝８１，９２０ドットを表示するものとすれば、全体で８１，９２０×１６＝１，３１０，７２０ドットを表示することができる。この画素数を用いて、例えば、１画像６４０×３２０ドットの画像を面積階調を用いて表示する場合は、１，３１０，７２０÷（６４０×３２０）＝６．４ドットとなり、約６ドットで１画素を表示すれば良いことになる。この例では、４×４の場合を示しているが、この配列のサイズが更に大きくなれば、１画素に用いることができるドット数を更に増加することができ、１６階調、或いは、３２階調等のより高度な階調処理を行うことが可能になる。

【００６７】図１２は、この発明の画像表示システムの他の例を示す図である。図１２に示す構成と図２に示す構成において異なる点は、投写レンズ２１，２２の代わりに焦点距離が異なる投写レンズ２１ａ及び２２ａを用いている点である。投写レンズの焦点距離が変更された場合、投写レンズからスクリーン１までの距離Ｄ１と投写レンズから液晶パネルまでの距離Ｄ２が変更されなければならない。そこで、液晶モジュール２０は、取り付け台１１に対して矢印Ａ１及びＡ２の方向にスライド可能に取り付けられるようにしておく。また、光モジュール３０は、液晶モジュールに対して矢印Ｂ１及びＢ２の方向にスライド可能に取り付けられるようにしておく。このように、液晶モジュールと光モジュールがスライド可能に取り付けられるようにしておくことにより、投写レンズを交換した場合でも、この画像表示システム１０が柔軟に対応することが可能である。なお、液晶モジュール２０及び光モジュール３０がスライド可能に取り付けられる構造は、特に図１２には示していないが、公知のスライド機構等を用いて行うことができる。また、これらのスライドによる位置調整は、スクリーン１を巻き上げることにより、また、遮光板６０を抜き取ることにより、画像表示システム１００の前面から行うことができる。

【００６８】前述したように、遮光板６０は、取り付け台１１に抜き差し自由に取り付けられている。遮光板６０を抜くことにより、前述した液晶モジュールや光モジュールの取り付けやメンテナンスが容易になる。また、遮光板６０自体が損傷した場合に交換することが容易になる。

【００６９】図１３は、液晶モジュール２０の他の例を示す図である。図１３に示す液晶モジュール２０が図２に示す液晶モジュールと異なる点は、反射ミラー３３の代わりに、全反射板３３ａを用いている点である。図２に示した反射ミラー３３を用いる場合は、反射ミラー３３による光の損失が発生するが、図１３に示す全反射板３３ａは、屈折率を利用した反射板であり、入力した光を全反射するものである。従って、反射による光の損失がない。全反射板３３ａは、偏光ビームスプリッター３２と一体化されたものであり、偏光ビームスプリッター３２と全反射板３３ａを屈折率ｎの物質の両側に成形することにより、偏光ビームスプリッター３２と全反射板３３ａを容易にモジュール化した構成にすることができる。

【００７０】図１４は、液晶モジュール２０の他の例を示す図である。図１４（ａ）においては、２つの偏光ビームスプリッター３２，３６を用いている例を示している。７１～７４は光路を形成する反射ミラーである。偏光ビームスプリッター３６は、２つの液晶パネル３４及び３５からの画像を合成するものである。従って、投写レンズは、１つだけで良い。一方、図１４（ｂ）に示す

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例は、偏光ビームスプリッター３２に対して、液晶パネルを垂直方向に配置した例を示している。なお、特に図示していないが、液晶モジュールには、カラー用液晶パネルと輝度用液晶パネルの２つの液晶パネルが存在する場合に限らず、単に１枚のカラー用液晶パネルが存在する場合でも構わない。或いは、液晶モジュールには、Ｒ，Ｇ，Ｂのそれぞれを表示する３枚のカラー用液晶パネルが存在していても構わない。更には、Ｒ，Ｇ，Ｂ，Ｙをそれぞれ表示する４枚の液晶パネルが存在している場合でも構わない。

【００７１】図１５は、反射ミラー７０を用いた画像表示システムの一例を示す図である。投写レンズ２１から投写された光は、反射ミラー７０により反射され、スクリーンの背後に投写される。反射ミラー７０が存在することにより、画像表示システムの奥行きＤを更に小さくすることが可能になる。更に、反射ミラー７０が存在することにより、反射ミラー自身が他の液晶モジュールからくる光を遮光することができるので、前述したような遮光板６０を省略することができる。但し、省略することができる遮光板は、上下方向に置かれた遮光板だけであり、左右に置かれる遮光板は、必要である。

【００７２】図１６は、この発明の画像表示システムの他の例を示す図である。図１及び図２においては、液晶モジュールが各部分画像毎に独立して存在していたが、図１６に示す場合には、投写レンズや液晶パネル等の各部品を部品毎に配列板に配列することにより、画像表示システムを構成しようとしたものである。即ち、投写レンズ２１，２２を投写レンズ配列板４００に配置する。また、液晶パネル３４，３５を液晶パネル配列板５００に配置する。また、偏光ビームスプリッター３２と反射ミラー３３を配列板６００に配置する。更に、レンズ３１をレンズ配列板７００に配置する。光ファイバケーブル５３を光ファイバケーブル配列板８００に配列する。このように、配列された各配列板は、図１７に示すキャビネット１０に対して所定の間隔を持って配置される。各配列板４００～８００をメンテナンスする場合には、キャビネット１０のサイドパネル（図示せず）を開け、各配列板を溝９９に沿ってスライドさせることにより、各配列板を取り出して行うことができる。

【００７３】図１８は、この発明の画像表示システムの他の例を示す図である。前述した例においては、スクリーンが１枚のパネルから構成されている場合について説明したが、この例においては、スクリーン自身が部分的に分割されている場合を示している。スクリーンを部分スクリーン１ａ，１ｂ，１ｃ，・・・に分割することにより、画像表示システムをモジュール化することができる。図１８に示す場合は、３×４＝１２個のモジュール９００から構成されている場合を示している。

【００７４】図１９は、図１８に示したモジュールのＢ－Ｂ断面を示す図である。各モジュール９００は、他の

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モジュールと分離することができ、モジュール９００を光ファイバケーブル５３及び図示していないバス２１０と接続することにより、スクリーンの一部として動作可能となる。前述したように、モジュール９００の内部には図示していないプロセッサ部２２０が存在しており、バス２１０を介して制御部３００がこのプロセッサ部２２０に対して表示すべき部分画像を指定することにより、各モジュール９００が指定された部分画像を表示することが可能になる。

【００７５】図２０は、この発明の光源の他の例を示す図である。前述した例においては、光源５０から光を放射して利用する場合を説明したが、図２０に示す場合は、自然光（太陽光）を集光器５８により集光し、集配部５９が各部屋に配置された画像表示システム１００に対して光を供給する場合を示している。自然光を用いることにより、集光された光は、平行光線であるため、よりクリアな画像を生成することが可能になる。図２０（ａ）に示す集光器５８は、平面板を利用している場合を示しているが、図２０（ｂ）に示す集光器５８は、球面をしている場合を示している。六角形に区切られた各部品内においては、レンズが配置されており、レンズにより自然光を集光し、ファイバ束５２に光を出力する。

【００７６】なお、図２０に示すシステムは、夜間は使用することができない。従って、画像表示システム１００の内部には、図１に示したような光源５０を準備しておく必要がある。また、図２０に示すような集光器５８を用いる場合には、内部にある光源５０と切り換えるための切り換え器が必要である。或いは、切り換え器の代わりに、集光器５８からの光と光源５０からの光を合成する合成器を備えていても構わない。

【００７７】図２１は、図１８に示したように、画像表示システムがモジュール９００により構成される場合の応用例を示す図である。図２１においては、複数のモジュール９００が天井及び壁に配置されている場合を示している。天井のサイズや壁のサイズ等に合わせてモジュール９００を自由に配置することにより、柔軟性のあるスクリーンを構成できる。また、図２１のように、天井や壁にスクリーンを配置することにより、仮想の窓や仮想の空を表示することが可能になる。例えば、壁に配置したスクリーンにより海岸を表示させ、天井に配置したスクリーンにより夏の青空を表示させることにより、視覚者がいる空間を、あたかも海辺の別荘のようにすることができる。また、画像を表示することなく、単に光を放射するようにしても構わない。液晶パネルは、通過する光の量を駆動信号により制御できる機能を持っているため、図示していない調整機構により、画像を表示することなく、単に光源から照射される光をスクリーンに表示することにより照明器具としての機能を果たすことができる。前述した図２０のように、集光器５８により自然光を取り入れた場合には、部屋の中に自然光を取り入

れることができる。また、照明器具として用いる場合は、スクリーンを取り外すようにしても良い。前述したように、ファイバ束５２を構成するファイバ５４として、石英ファイバ、プラスチックファイバを用いることが考えられるが、プラスチックファイバを用いる場合には、紫外線を除去することができる。従って、光源から放出された光や自然光を部屋の中に照射する場合でも、プラスチックファイバを用いることにより、紫外線をカットした安全な光を供給することができる。

【００７８】図２２は、更に、他の応用例を示す図である。図２２においては、表示スクリーンを折り畳み可能にした場合を示している。また、スクリーンを凹型にした場合を示している。スクリーンを屏風のように折り畳むことにより移動し易くなる。また、格納場所を節約できる。また、視覚者に対してスクリーンの一部を接近できるようにすることにより、迫力のある画像を提供することができる。

【００７９】図２３は、モジュール９００が内側にカーブしている場合を示している。モジュール９００のスクリーンが視覚者に対してカーブすることにより、視覚者の最大視野角度でのワイドな画面を提供することができる。

【００８０】図２４は、更に、スクリーンがドーム型をしている場合を示している。図２５及び図２６は、ドーム型スクリーンを構成する場合のモジュールを示す図である。ドーム型スクリーンを構成する場合の部分スクリーン１ａ，１ｂ，１ｃ，１ｄ，・・・は、六角形をしていることが望ましい。六角形をしていることにより、ドーム型のスクリーンを構成することが容易になる。図２６は、部分画像が六角形をしている場合の液晶モジュールを示す図である。部分画像が六角形をしていることにより、液晶パネル３４も六角形をしており、かつ、光ファイバケーブル５３の端面も六角形にする。このように、スクリーンの形状に合わせて、液晶パネルや光ファイバケーブルの形状を合わせることにより、光の利用効率において、無駄のない画像生成を行うことが可能になる。

【００８１】前述したように、この発明においては、１画像が複数の部分画像から構成され、各部分画像は、各々液晶モジュールにより作成される。従って、１つの液晶パネルを用いて大きな画面を作成していた従来の液晶プロジェクションテレビのように、水平方向に対して中心ゲインを上げるために用いていたフレネルレンズやレンティキュラ板を用いる必要がなくなる。前述したように、フレネルレンズとレンティキュラ板は、大型画像の中心と周辺部分における視覚特性の不均衡を是正するために設けられているものであるが、この発明のモジュール化された部分画像サイズは、例えば、１０インチ～２０インチの範囲のものであり、この程度の部分スクリーンに対して液晶パネルを用いて画像を表示する場合には、レンティキュラ板やフレネルレンズを用いる必要がなく、スクリーンのコスト自身が安くなる。この例においては、スクリーンは、拡散素材を含んだ着脱可能なパネルであれば良い。

【００８２】なお、前述した例においては、１つの光源を用いてシステム内の全ての液晶モジュールに対して光を供給する場合について説明したが、光源５０を１つのシステム内に複数持たせるようにしても構わない。即ち、複数の光源の各々が複数の液晶モジュールに対して、光を供給するようにしても良い。例えば、光源の数を２個、液晶モジュールの数を８個とすると、２個の光源全てが８個の液晶モジュールに光を供給しても良いし、各光源が４個の液晶モジュールに光を供給するようにしても良い。この発明の大きな特徴は、少なくとも１つの光源から複数の液晶モジュールに対して光を供給している点であり、少なくとも１つの光源に対して、１つの光源から光を供給する液晶モジュールが複数個存在するという関係があれば良い。

【００８３】図２７は、複数の光源と複数の液晶モジュールを備えた画像表示システムの構成例を示す図である。図において、５０ｆは紫外・赤外線遮断フィルタである。１つの光源５０からの光は分岐して、複数の液晶モジュールに光を供給している。このように、光源を複数備えることにより、複数の液晶モジュールにより大型の画像表示システムを構成する場合でも、鮮明な画像を得るのに充分な光を供給できる。

【図面の簡単な説明】

【図１】　この発明の画像表示システムの一例を示す図である。

【図２】　この発明の画像表示システムの側断面を示す図である。

【図３】　この発明の光ファイバケーブルを示す図である。

【図４】　この発明の信号処理部を示す図である。

【図５】　この発明の液晶パネルの特性を示す図である。

【図６】　この発明の補正回路の動作を説明する図である。

【図７】　この発明の補正回路の構成の一例を示す図である。

【図８】　この発明の補正回路の補正テーブルを示す図である。

【図９】　この発明のプロセッサ部の他の例を示す図である。

【図１０】　この発明の面積階調処理部が用いる２値化手法を示す図である。

【図１１】　この発明の面積階調処理部の具体例を示す図である。

【図１２】　この発明の液晶モジュールの取り付けを示す図である。

【図１３】　この発明の液晶モジュールの他の例を示す図である。

【図１４】　この発明の液晶モジュールの他の例を示す図である。

【図１５】　この発明の反射ミラーを用いた画像表示システムを示す図である。

【図１６】　この発明の配列板を用いた画像表示システムを示す図である。

【図１７】　この発明の配列板を用いた画像表示システムを示す図である。

【図１８】　この発明のモジュールを用いた画像表示システムを示す図である。

【図１９】　この発明のモジュールの側断面を示す図である。

【図２０】　この発明の集光器を用いた画像表示システムを示す図である。

【図２１】　この発明のフラットスクリーンを示す図である。

【図２２】　この発明の折り畳み式スクリーンを示す図である。

【図２３】　この発明のインカーブスクリーンを示す図である。

【図２４】　この発明のドーム型スクリーンを示す図である。

【図２５】　この発明のドーム型スクリーンの部分スクリーンを示す図である。

【図２６】　この発明のドーム型スクリーンに用いられる液晶モジュールの構成図である。

【図２７】　この発明の複数の光源を用いた画像表示システムを示す図である。

【図２８】　従来のＣＲＴを用いた画像表示装置を示す図である。

【図２９】　従来の蛍光表示管を用いた画像表示装置を示す図である。

【図３０】　従来のプロジェクションテレビを示す図である。

【図３１】　従来のスクリーンを示す図である。

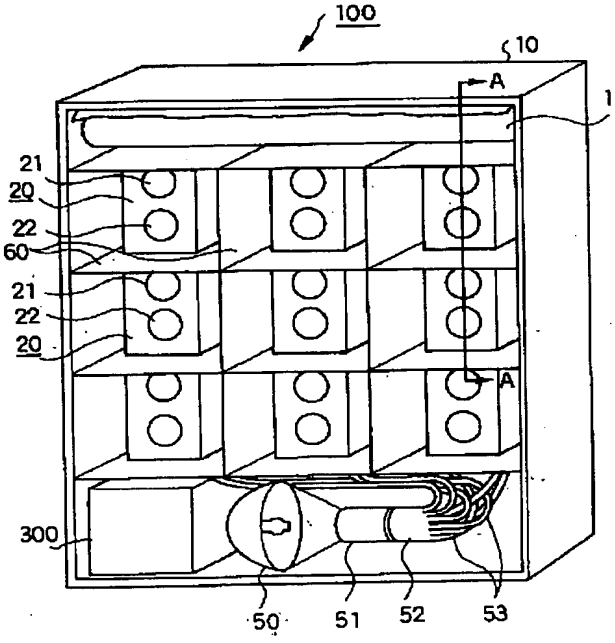
【図３２】　従来のスクリーン分割を示す図である。

【図３３】　従来のＣＲＴを用いた画像表示装置を示す図である。

【符号の説明】

１　スクリーン、１０　キャビネット、１１　取り付け部、１２　巻き取り軸、１３　バー、２０　液晶モジュール、２１，２２　投写レンズ、３０　光モジュール、３１　レンズ、３２　偏光ビームスプリッター、３３　反射ミラー、３４　カラー用液晶パネル、３５　輝度用液晶パネル、５２　ケーブル束、５３光ファイバケーブル、５４　ファイバ、２００　信号処理部、２２０　プロセッサ部、２３０　ＣＰＵ、２４０　メモリ、２５０　復号部、２６０　補正回路、３００　制御部、３１０　符号化部、３２０　メモリ、３３０　ＣＰＵ。

【図１】



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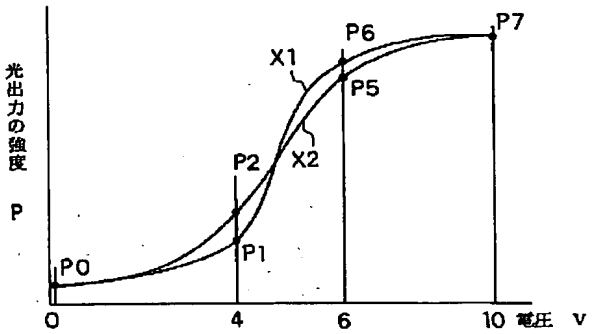

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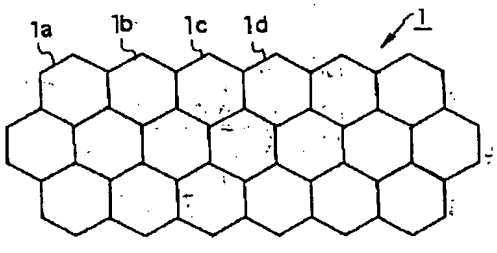

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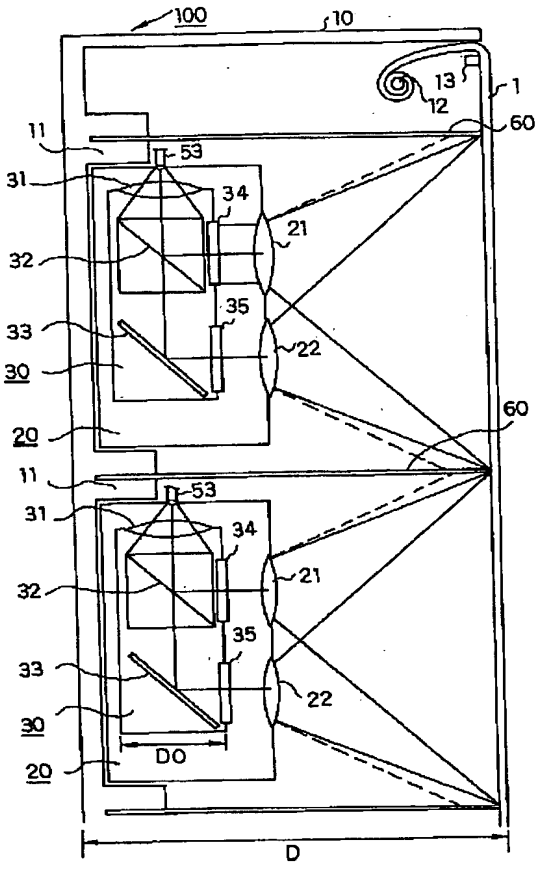

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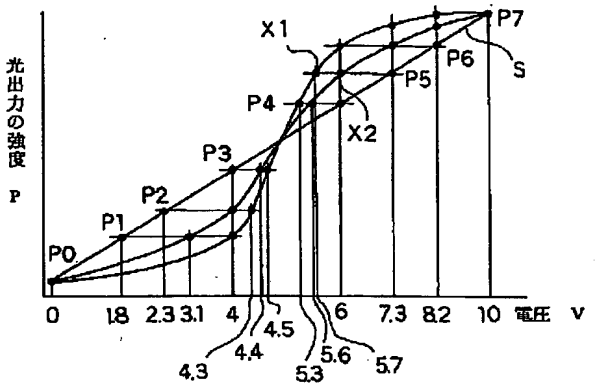

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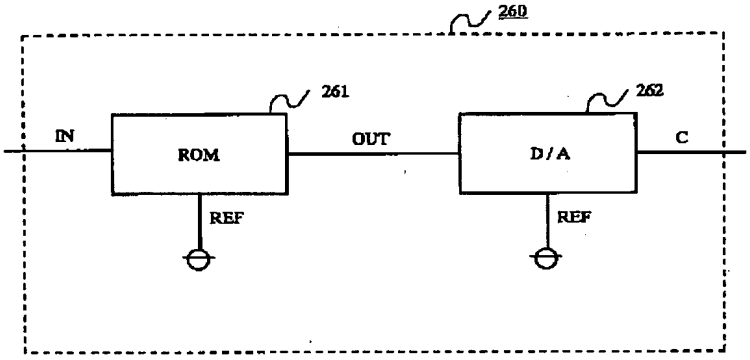

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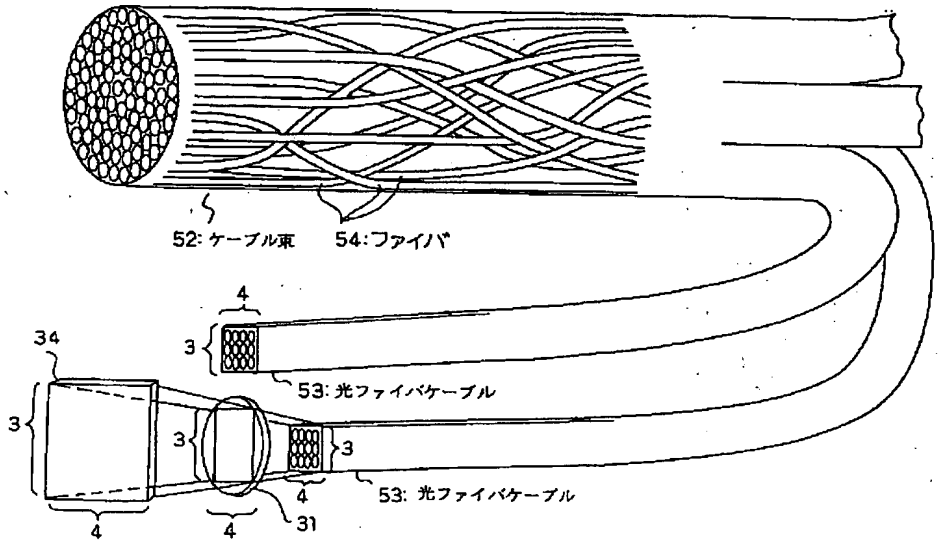

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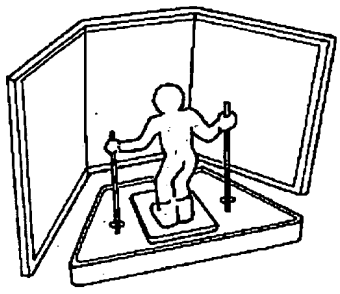

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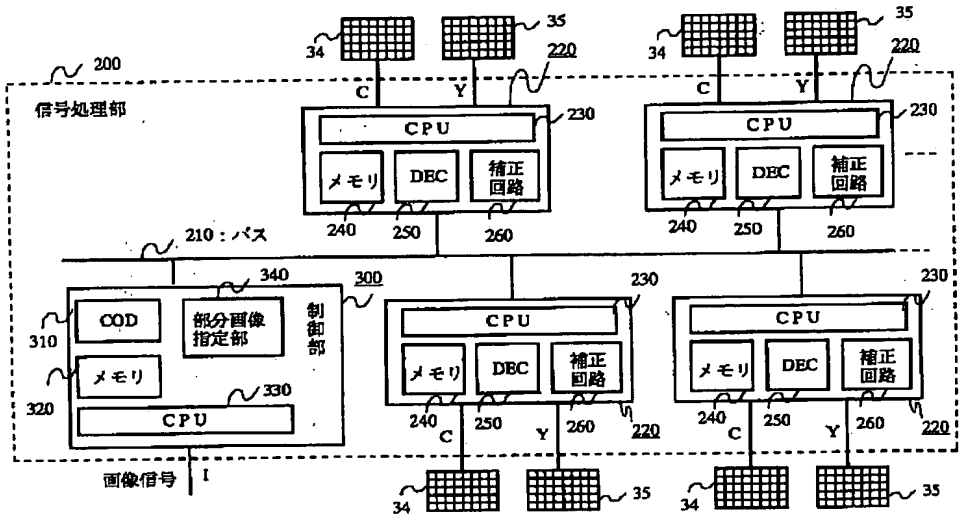
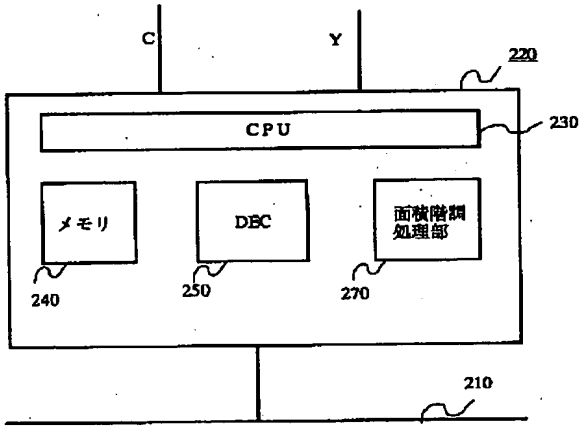


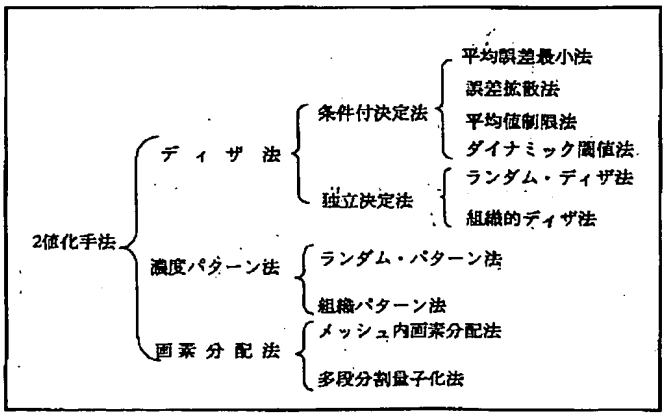
【図８】

特性X1用補正テーブル	
IN (V)	OUT (V)
0	0
:	:
1.8	4.0
:	:
2.3	4.3
:	:
4.0	4.5
:	:
6.0	5.3
:	:
7.3	5.7
:	:
8.2	6.0
:	:
10.0	10.0

【図９】



【図１０】



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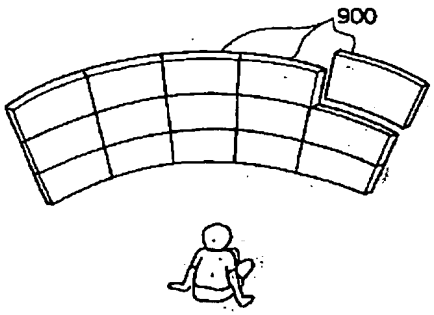
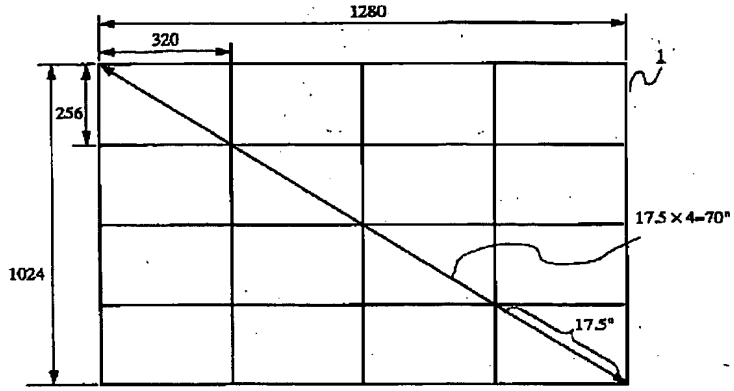


【図１１】



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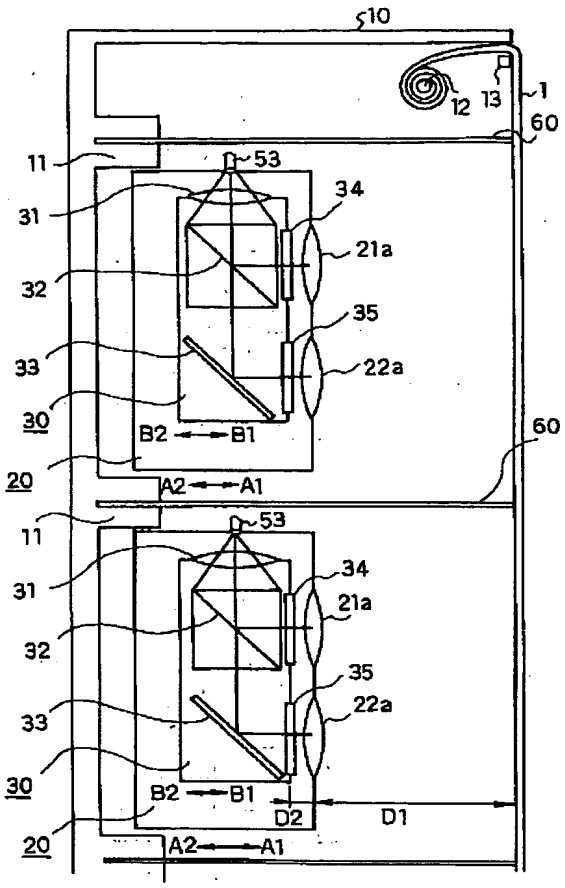

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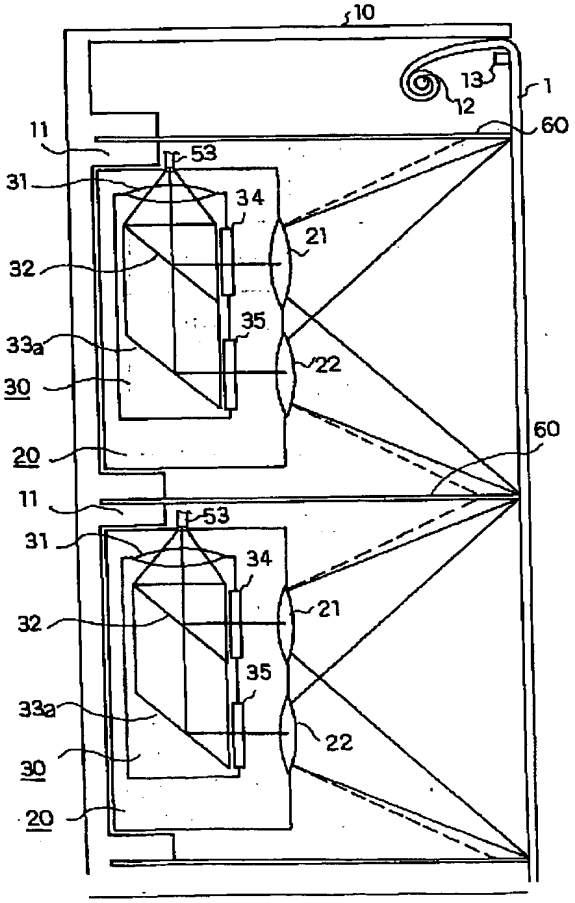

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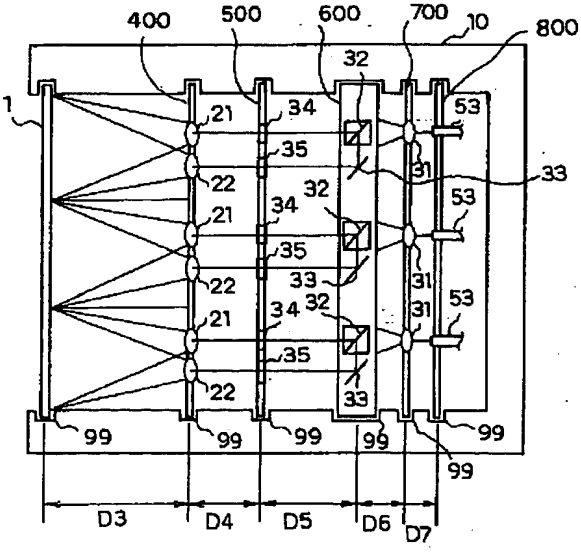

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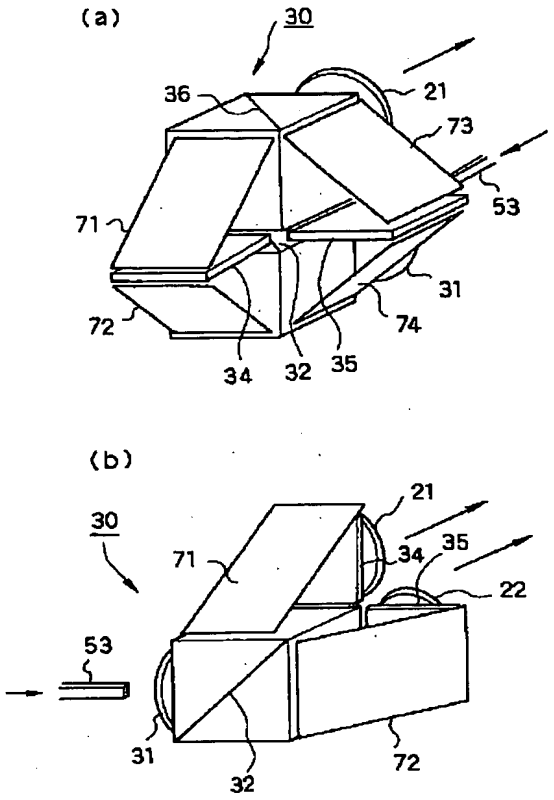

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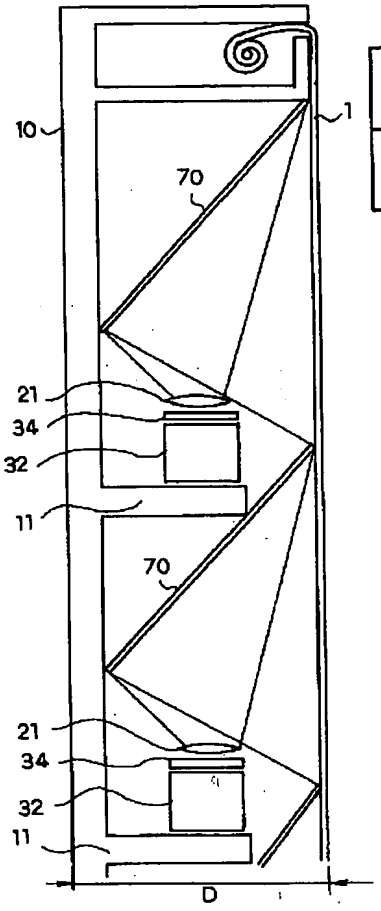

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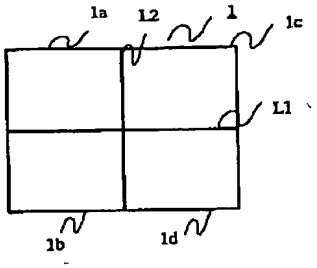

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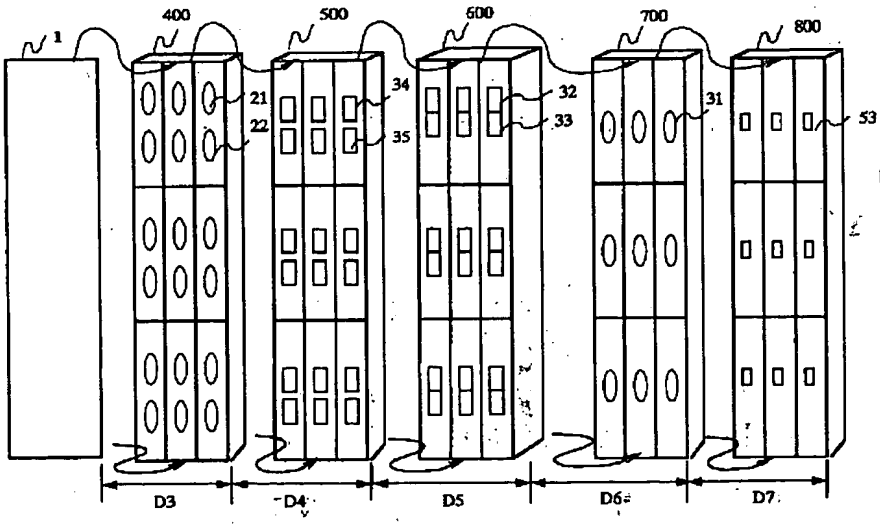

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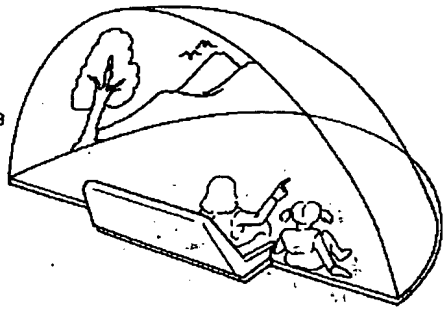

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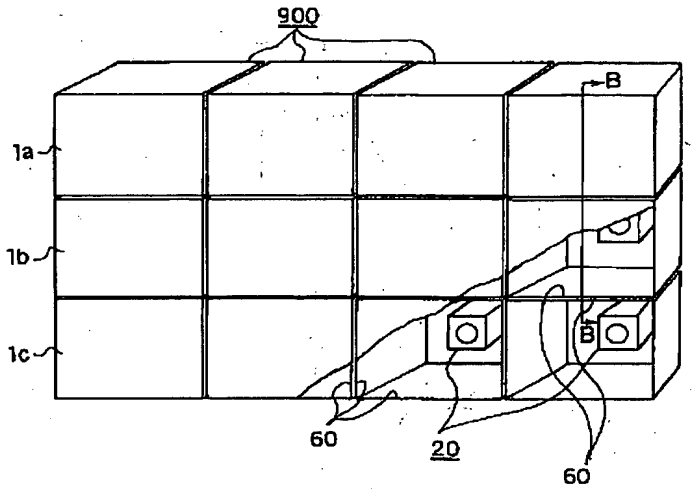

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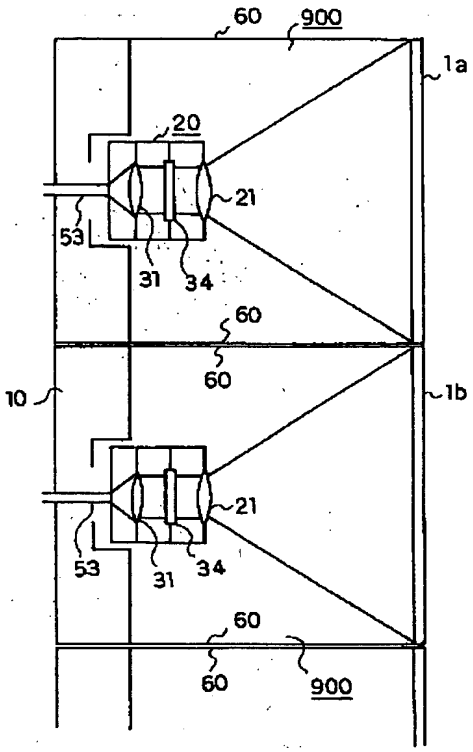
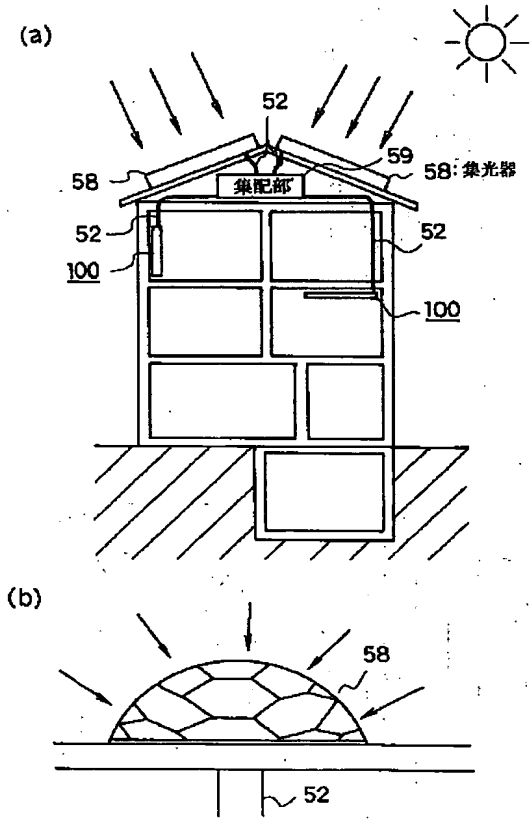
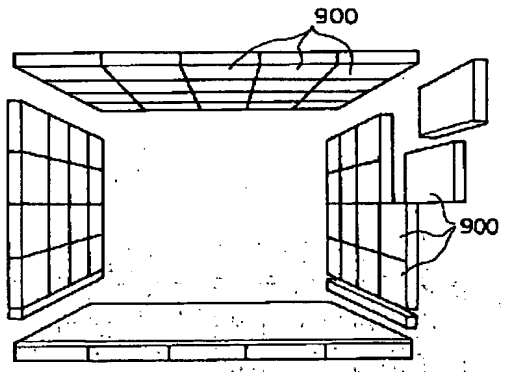


【図２０】



【図２１】



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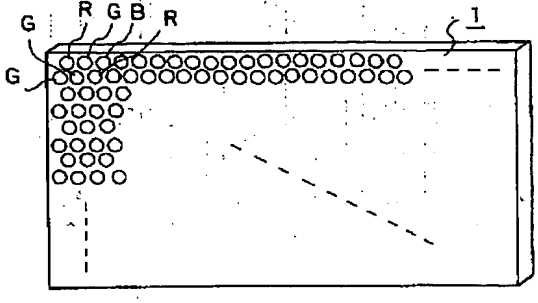

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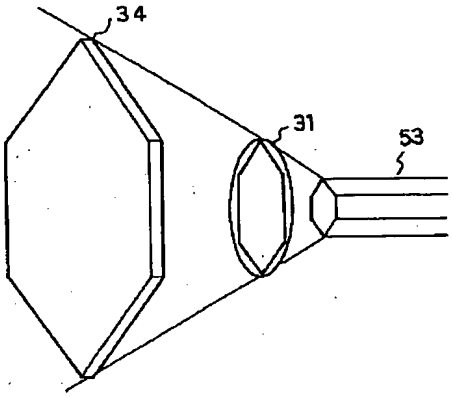

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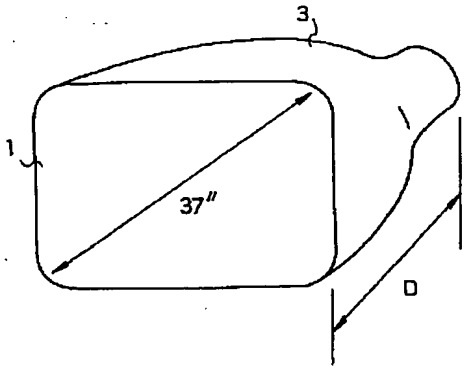

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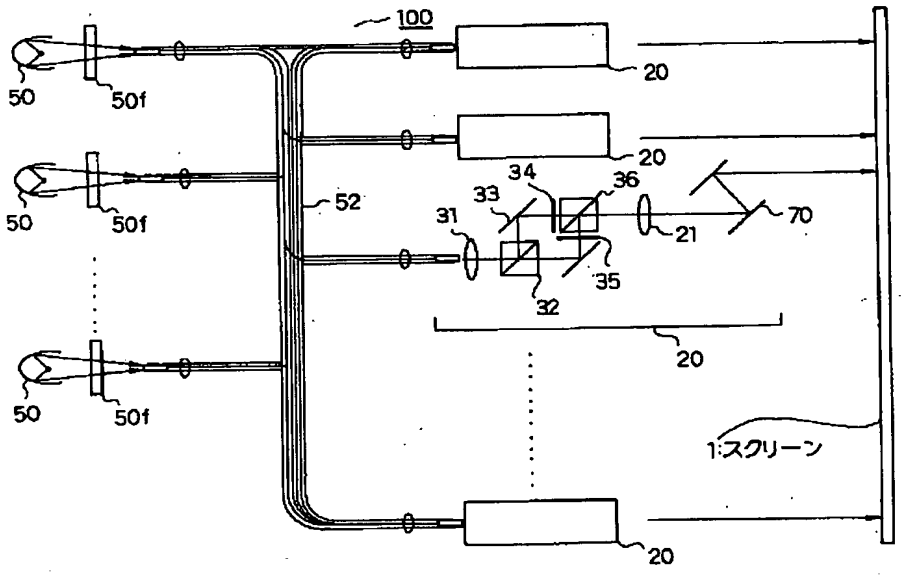
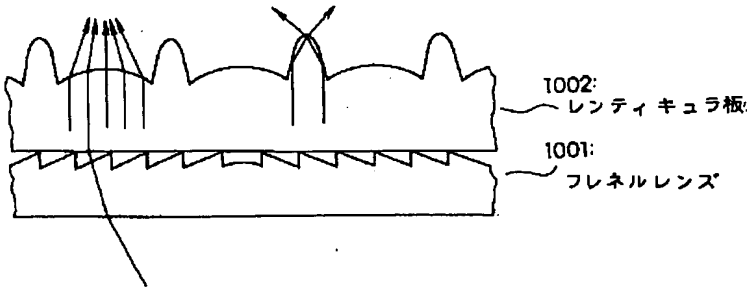


【図３１】



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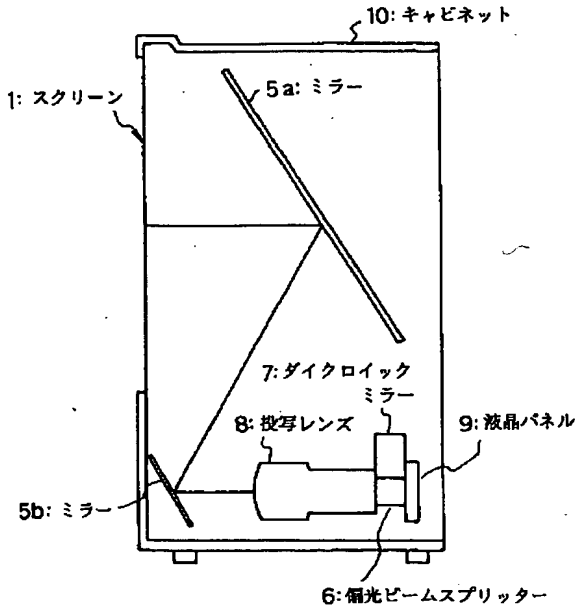
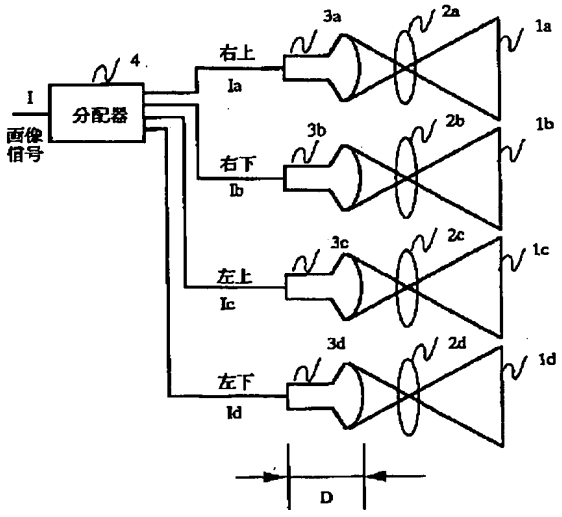


【図３３】



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